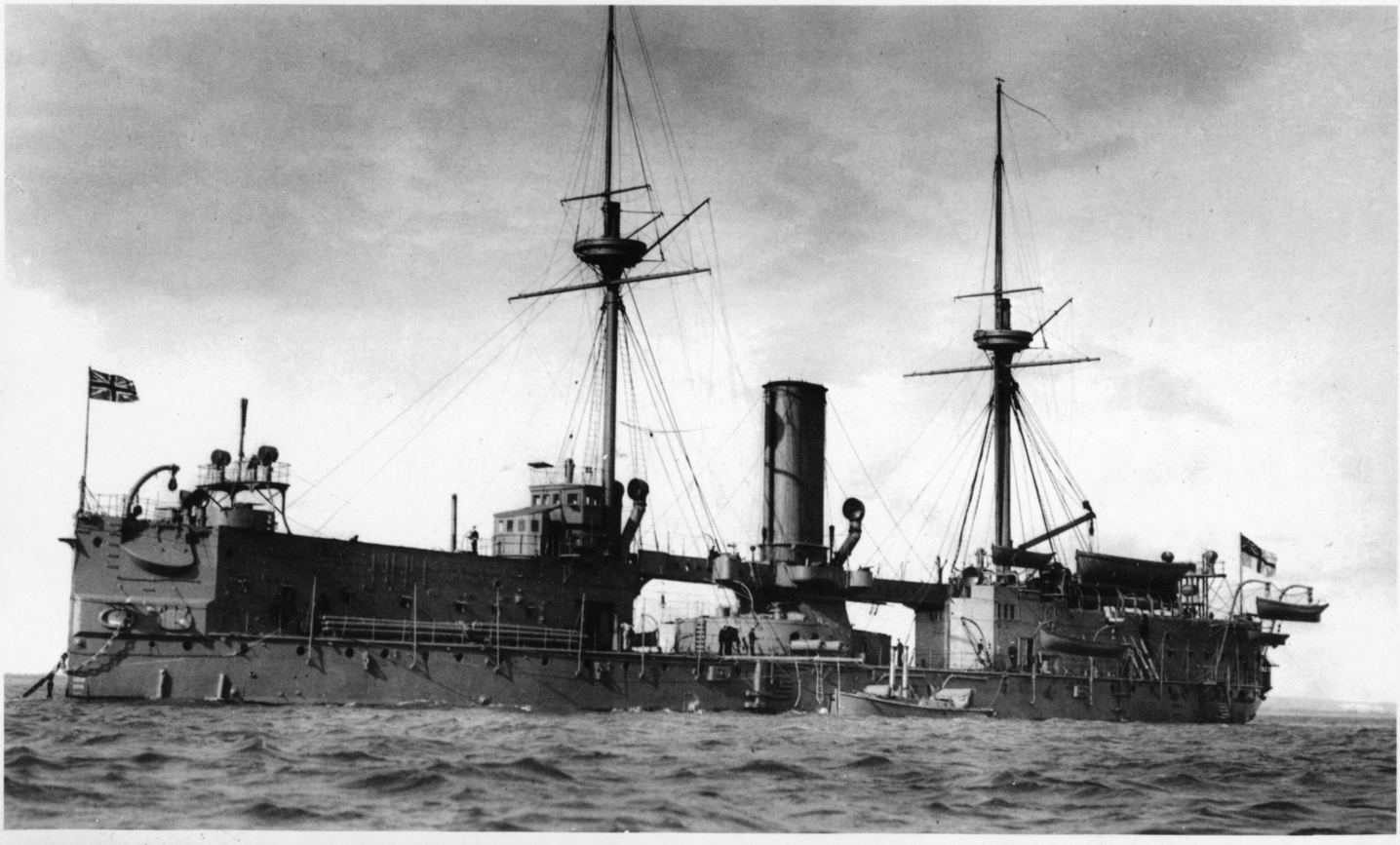
World Warships in Review 1860-1906

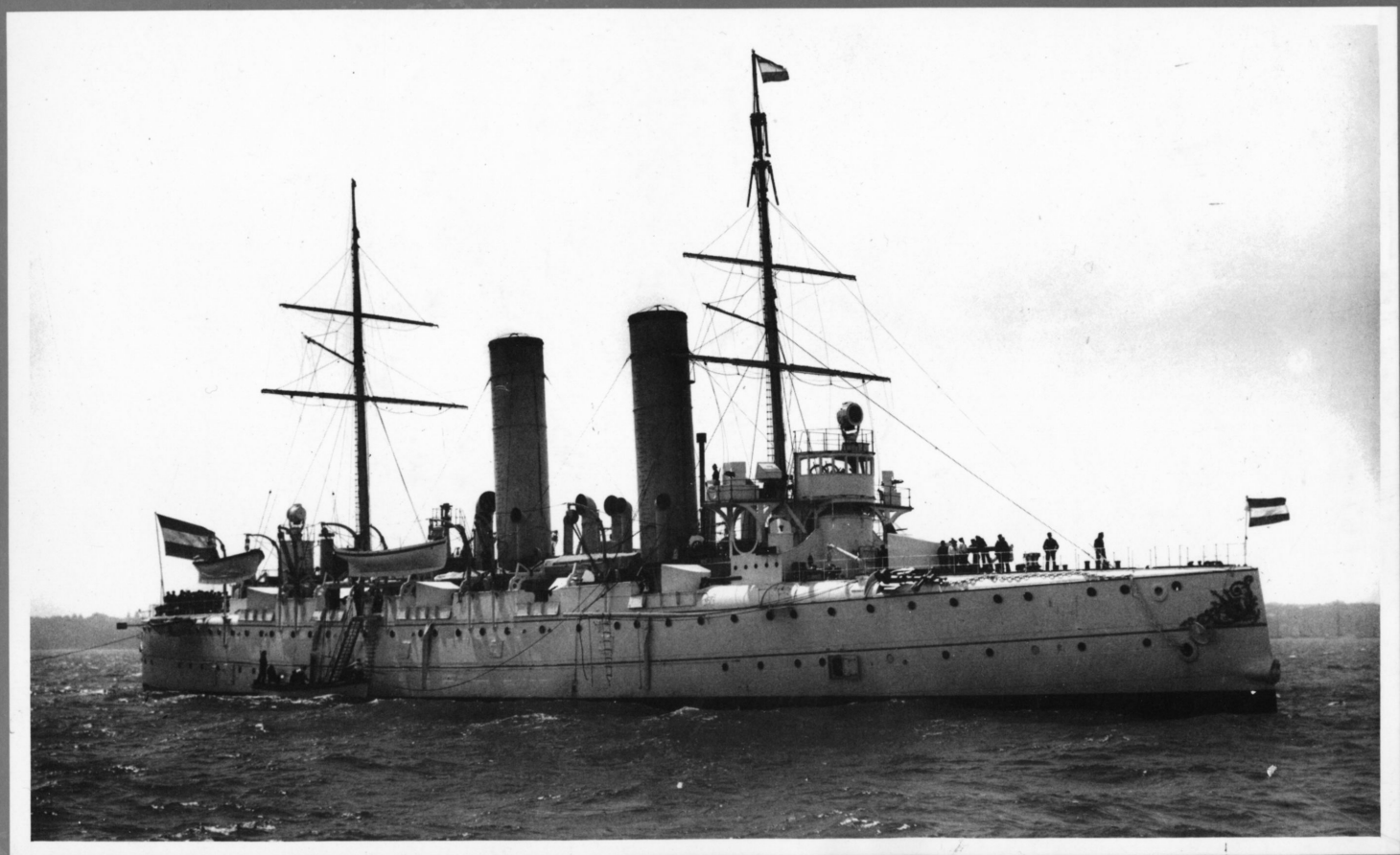
John Leather



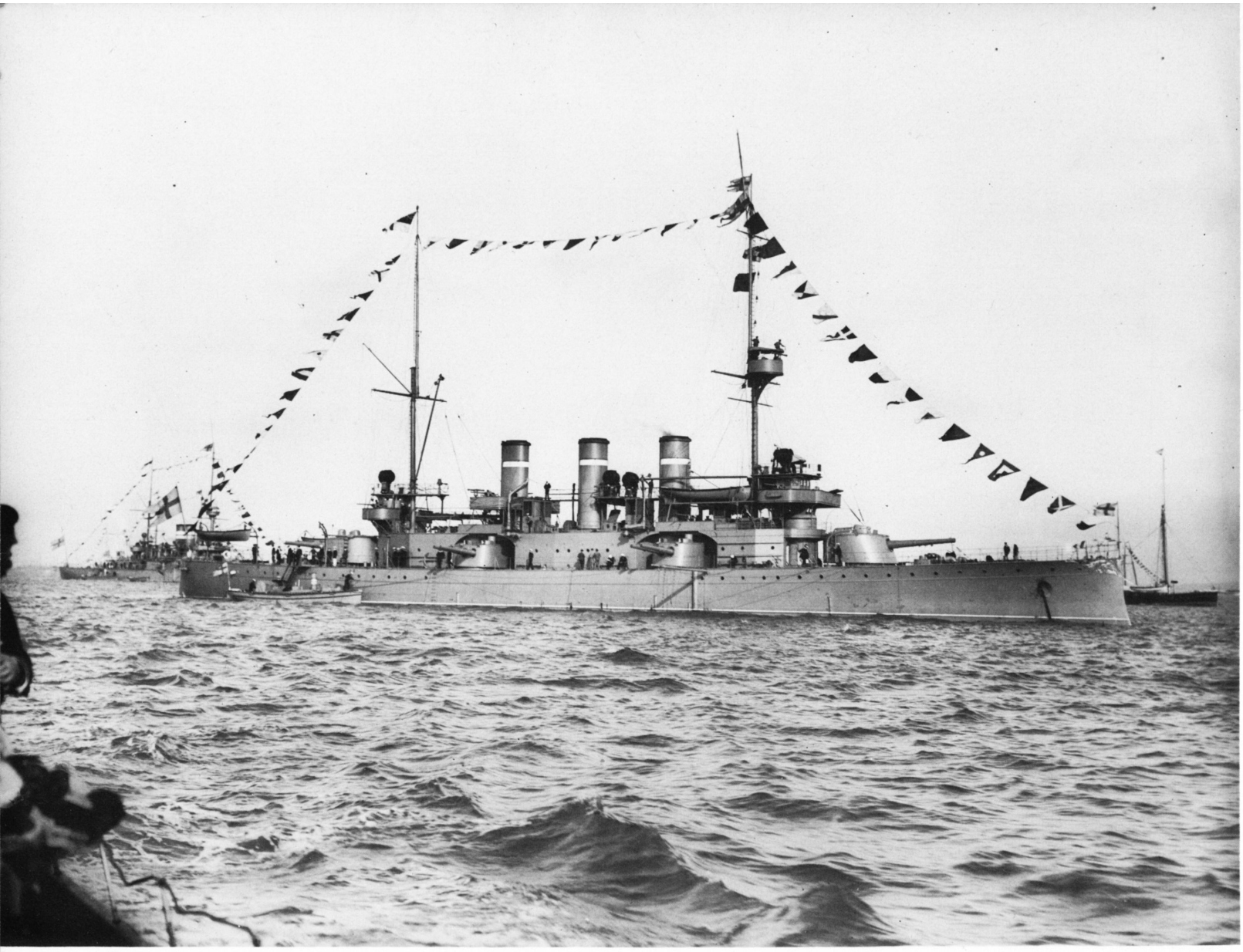
Photographs by Beken of Cowes

World Warships in Review 1860-1906

John Leather



Photographs by Beken of Cowes



OSCAR II, SWEDISH ARMOURED COAST DEFENCE SHIP, 1907

WORLD WARSHIPS IN REVIEW 1860/1906

John Leather

With photographs by Beken of Cowes

BOOK CLUB EDITION

Copyright © 1976 John Leather

Printed in Great Britain by
REDWOOD BURN LIMITED
Trowbridge & Esher

This edition published by
Purnell Book Services Limited
St Giles House, 49-50 Poland Street, London W1A 2LG
by arrangement with Macdonald and Jane's (Macdonald & Co. (Publishers) Ltd)

ISBN 0 356 08076 5

CONTENTS

INTRODUCTION 7

BATTLESHIPS I 9

BATTLESHIPS II 53

CRUISERS 129

TORPEDO BOATS 229
TORPEDO GUNBOATS
TORPEDO BOAT DESTROYERS

MISCELLANEOUS CRAFT 253

INTRODUCTION

The half-century spanned by the ships in this book saw the beginning of an ever quickening tempo in the design, construction, propulsion, armament and protection of fighting ships, which continues today in this age of gas turbines and rocket missiles. Now navies are accustomed to radical change, but it was only in 1860 that the ironclad, steam-propelled seagoing warship became reality, first emerging in France after centuries of wooden-hulled sailing predecessors. Although armoured, these new ships retained broadside-mounted guns firing through ports, and most were fully rigged, whether they could sail or not – a safeguard considered necessary when ocean-going marine engines were still regarded as unreliable, coal consumption was high and bunkering facilities far apart or non-existent in distant seas.

During the following thirty years wild experiments were made in warship design; instead of the size, armament and rig of warships being subject to gradual development, many were outclassed almost before the keel was laid. Improvements in guns, armour, size, engines and speed went forward so quickly, with each development interacting on the rest of the design, and all navies equally ignorant of the best design for a warship with particular duties, that major fleets became a curious collection of widely differing types. Eventually definite types emerged, but the rapid development continued.

Fascinating photographs of this period of greatest naval change were caught by the camera of Beken of Cowes, the internationally renowned family of marine photographers, and from their treasury of warship negatives I have selected one hundred and thirty-three of the best, illustrating ships of typical or special interest. Each ship portrait is hitherto unpublished and most have great clarity of detail. Ships of contemporary types in different navies are contrasted: battleships, armoured cruisers, protected cruisers, unarmoured ships, shallow-draught coast defence ships, sloops, torpedo boats, destroyers, torpedo gunboats, training ships and other craft. In a work of this size the general text serves only as an outline of a very complex period but the characteristics and careers of the selected ships are examined in detail.

My thanks are due to Tony Sutherland, a fellow ship surveyor, and to John Freestone, another colleague at Lloyd's Register of Shipping, who both helped with some difficult research, and to Kenneth Beken and his staff for willing help when selecting the photographs.

John Leather
Cowes, 1975

BATTLESHIPS I

The steam-propelled battleship succeeded the wooden sailing ship of the line as the principal force determining command of the sea. During the period 1860-1906, covered by this book, they underwent enormous changes and development, not only to counter improved guns and armour in ships of other fleets, but to overcome the increasing menace of torpedoes, torpedo boats and then the submarine. The principal powers owning battleships during this time were first France and Britain, with Russia, Italy and Austria closely following; then Germany, and finally America and Japan. Some other smaller nations could also boast of a battleship or two, sometimes of considerable power and sophistication, but never in quantity.

The era of heavily armoured warships dated from 1860 until 1945, and their dominance was effectively determined by the evolution of the "great gun", until aircraft and rocket power eclipsed them. But at the time the nations which owned the most of these sea mammoths ruled the seas, and throughout this period it was unquestionably Britain.

The gun-armed sailing warship had been developing since the fifteenth century, and had reached near perfection by the mid-nineteenth, when ships of the line were slightly larger and more heavily armed than those at Trafalgar *(Plate 1)* but still carried smooth-bore guns on one, two or three decks of wooden hulls. Warships of different nations varied little in construction, form, rig or armament, so that superiority of seamanship was all-important. Steam marine engines and the rifled shell gun were to change all that, but it was the screw propeller which really started the naval revolution.

Although steam paddle frigates were built for many navies, this system of propulsion was too cumbersome and vulnerable to be used in battleships. Trials with screw-propelled craft against paddle finally convinced the British Admiralty, and the screw frigate *Dauntless* was laid down in 1844 after the frigate *Amphion* had been converted with an auxiliary steam engine and propeller.

In 1850 the French 92-gun, wooden ship of the line *Napoléon* was completed as an auxiliary screw steamer, capable of 13¾ knots. The following year the British *Sanspareil* was similarly converted and in 1852 the two-decker *Agamemnon* was designed and built as an auxiliary. By 1858 thirty-two British wooden ships of the line had been built or converted with auxiliary steam engines and single screws and the French had the same number. The long-standing superiority of numbers of Britain's battle fleet had gone.

During 1858 four frigates were commenced for the French Navy. These were wooden ships but were designed with shell-resisting iron plates bolted on to the hull planking. These were the first ironclad seagoing battleships, intended to outclass the huge British fleet of auxiliary ships of the line and be capable of resisting the rifled shell-firing guns which were mounted in the major ships of most sizeable fleets. The effectiveness of these shells had been proved in 1853 when a squadron of six Russian ships of the line attacked ten Turkish frigates and corvettes in the Bay of Sinope. The Russian ships approached to within 500 yards through a storm of round shot from the Turkish ships and shore batteries and sank the whole fleet with shells.

During the bombardment of Kinburn, in the Crimean war, French floating batteries armoured with 4-inch iron plates were surprisingly successful in close bombardment of shore batteries, which failed to pierce their armour.

By 1857 French experiments with rifled shell-guns convinced them that only ships with thick iron armour outside their wood hulls would withstand these weapons. The large programme of wooden warship building was suspended while a design for a single screw, wooden-hulled armoured steam frigate was prepared by the leading French naval architect Dupuy de Lôme. He produced a 252ft ship with thirty-four broadside-mounted guns and the sides sheathed with 4½-inch thick iron armour from just below the waterline to the sheer. In March 1858 work on the *Gloire* and her sister ships *Invincible, Normandie* and the iron-hulled *Couronne* commenced. The speed was to be 13 knots and a three-masted barquentine rig was carried. Use of wooden hulls enabled them to be built quickly from available materials and labour.

In Britain, gun development and testing of armour had produced similar results and conclusions, but the Admiralty did not wish to start construction of any radical ships that might prejudice the country's immense lead in highly developed wooden sailing and auxiliary warships.

In May 1858 the Admiralty heard of the building of the new French armoured frigates and it became imperative to match them. However, in 1859 wooden-hulled steam battleships were still building in Britain, armed with 68-pounder shell guns having an effective range of about 1,200 yards. These ships were inferior to the first class steam frigates built during the previous five years for the British, American and French navies, which were heavily armed with long-range guns, and in addition had the speed and manoeuvrability of attack to suit the armament. If such ships could be armoured it would be decisive in a short-range action.

Thus the steam frigate carrying a broadside armament on one deck was the logical type for the first British "ironclad", which was commenced to Admiralty design in May 1859: 380ft long by 58ft beam, 8,600 tons displacement and capable of 14 knots with 5,000 IHP on one screw. The best feature of the design was the all-iron hull, far superior to the French ironclads, and armoured with 4½-inch thick iron amidships. She had a full ship rig and two stumpy funnels, was launched as the *Warrior* in December 1860 and commissioned in October 1861 as Britain's first seagoing armoured warship, followed in 1862 by the sister ship *Black Prince*. Both mounted twenty-six 68-pounders, ten 110-pounders and four 70-pounders – the two latter being breech loading. All guns were on one deck. 850 tons of coal were carried and a crew of 707 men. The ships were graceful in appearance, with a clipper bow, and were the pride of the Channel fleet for several years.

The *Gloire* was launched in November 1859 but did not complete until November 1860. Her successful trials caused ten more ironclads to be ordered for the French fleet, and the battleship race had begun. Other battleships, quickly termed "ironclads," followed, and the rival nations of Austria and Italy laid down similar ships in 1861. Russia ordered a 3,300-ton ironclad from the *Warrior*'s builders on the Thames and Turkey ordered three 6,400-tonners in England; while Spain commenced a 6,200-ton battleship.

The Admiralty quickly ordered more of the new ship type. The 280ft long *Defence* and *Resistance* were completed in 1861-2, then the similar *Hector* and *Valiant* in 1864 and 1868. They were barque-rigged ships with the guns on two decks, and had reverted to muzzle loading, which was preferred by the gunmakers at Woolwich Arsenal.

The 380ft long ironclad *Achilles* of 1864 was distinctive in having four masts and setting the greatest sail area of any British warship: 30,100sq ft. By then a squadron of ironclads maneouvring in the Channel was a common sight, though most were clumsy under canvas.

All these ships carried the guns as a broadside battery behind a belt of armour which varied in length. The idea of mounting one or two large guns in a revolving turret on a ship's deck was not new, and in the mid-nineteenth century was advocated energetically in Britain by a Captain Coles, among others. It was successfully demonstrated in the design of the American shoal draught iron steamer *Monitor*, and her many successors, during the civil war of 1861-5. Most of these ships were designed by John Ericsson, a Swede, though the Danish turret ship *Rolf Krake* and the Italian *Affondatore* were both designed and built in England before 1863, and other turret ironclads were building for Russia, Spain, Turkey and elsewhere. In the ironclad era which France had initiated, Britain was to have a tremendous advantage with her great and developing sources of industry which France could not match, so the British battle fleet increased from equal numbers in 1861 to superiority in numbers and construction after a decade, and thereafter maintained an increasing lead on France – regarded as her closest and likeliest enemy at the time.

In the early 1860's pressure of ironclad building was so great that Britain commenced several wooden-hulled armoured ships in the Royal dockyards: the *Royal Oak* of 1863 and the *Prince Consort, Caledonia* and *Ocean* of 1864-6.

In 1861 three large iron-built ironclads were ordered, the *Minotaur (Plate 2), Agincourt* and *Northumberland* – 400ft long, single-screw ships displacing 10,700 tons. 9- and 7-inch muzzle-loading rifled guns were carried broadside on two decks and the most striking feature was a five-masted rig.

Until the 1880's, designers of warships for ocean-going fleets were compelled to create steam-driven armoured ships with full sailing rigs to placate naval officers and administrations who were suspicious of machinery breakdown. Britain was particularly conscious of her world role as patroller and peacekeeper, which meant that most major warships had to be capable of operating anywhere in the world, often well away from coal supplies. Therefore sail lingered on in ships of the 1860's and 70's and sail drill was at least as important as gun drill, while the engineering branch of the fleet was regarded by many officers, as a very secondary part of the service grown complacent with tradition and lack of major action.

So the broadside muzzle-loading guns and elaborate rig of the *Minotaur* must be seen against the prevailing strong prejudices and sense of radical change in naval ways which was as confusing to the British Navy as to most others. For thirty years major fleets were to be motley collections of specimens or experimental types of individual ships, often inefficient and always increasingly expensive, making the operation of battle fleets difficult because of differing ship characteristics – speeds and gunpower varying in particular. Naval estimates became a nightmare to many governments and politicians constantly sought to limit

spending on new ships, but until 1914 the British fleet usually got what it needed, however grudgingly, as the government knew it was the best assurance of future peace of many countries.

The proving of seagoing ironclads occurred in the Adriatic where, in the war of 1866, the fleets of Italy and Austria met off the island of Lissa. Each side had ironclads directly derived from the *Gloire,* several almost new, and the Italians had the new turret ship *Affondatore.* As this was the first full fleet action to occur with the new type of warship it attracted considerable interest and some wrong conclusions which affected battleship design for some years. It was as much a clash of leadership and training as of material strength, with the Austrians under Admiral Tegetthoff having the best of it although the Italians, under Admiral Count Persano had two hundred rifled guns against the Austrian's seventy-four smaller pieces. During the action Tegetthoff's flagship, the ironclad *Ferdinand Max,* rammed and sank the Italian ironclad *Re d'Italia.* The small warship *Palestro* was also sunk but although the Austrian ironclads fired 1,386 shots, besides extensive firing by their unarmoured ships, Italian casualties, apart from those lost in the ships sunk, were only eight killed and forty wounded. The Italian fleet fired at least 1,400 shells but the Austrians had only three killed and thirty wounded in the ironclad ships. This vindicated iron armour as seagoing protection, and the successful ramming of the *Re d'Italia* confirmed a branch of naval thought convinced that future sea battles would be decided by the ram bow reinforced by heavy gunfire.

For a few years the armoured ship remained proof against gunfire until gun development caught up, and a leapfrogging contest began between gun designers and armour makers, which continued until the 1940's when battleship building ended.

Amongst the many British armoured ships ordered in the flurry of battleship building in 1861 was the ironclad *Research,* first to carry a few large guns in an amidship armoured "box battery" or "central battery" across the ship, arranged with ports to allow her 100-pounders to fire broadside, ahead or astern by recesses in the topsides. The *Research* was only 195ft long but was quickly followed by the similar and larger ships *Enterprise*, *Favorite*, *Pallas*, *Penelope* and *Hercules*, all fully rigged. Broadside ironclads such as the *Lord Warden*, *Lord Clyde*, *Bellerophon*, *Zealous*, *Royal Alfred* and *Repulse* continued to be built until 1870, and advocates of the turret principle pressed for a trial in a first class British battleship. However the Admiralty would only agree to turrets being fitted in low freeboard, unrigged coast defence ships and the first, the iron-hulled, armoured *Prince Albert,* was started in 1862 to carry four guns in single centreline turrets with low freeboard to maintain the centre of gravity as low as possible, a minimum of deck erections with a flying bridge over, and a short funnel – features common to many other ships of the coast defence type built for the British and other fleets.

Before the *Prince Albert* was completed the 131-gun, three-decked wooden ship of the line *Royal Sovereign* was cut down to a low freeboard ship with side armour and four circular turrets; the forward one having two 10½-inch guns and the three others single guns. Three light masts and a huge funnel made her the ugliest battleship ever built.

Many other small British turret ships followed: the *Scorpion* and *Wivern* of 1865, the mastless *Cerberus, Magdala* and *Abyssinia* for colonial service in India and Australia, the *Glatton*, the turret coast defence ram ships *Rupert* and *Hotspur* and the later *Cyclops, Gorgon, Hecate* and *Hydra*.

Persistent turret enthusiasts persuaded the Admiralty to order the seagoing turret ship *Monarch* in 1866, and this 330-footer was launched three years later with two turrets mounting four 12-inch muzzle-loading guns placed amidships above a low freeboard hull with a full length armour belt and a ship rig towering over her short funnel and flying bridges. She was a surprisingly successful ship but would have been improved if completed unrigged as originally designed. A similar low-freeboard turret ship was started in 1867 and was completed in 1870 as the *Captain.* She was heavily rigged for ocean service and passed trials successfully, although floating below designed waterline due to considerably increased construction weight. When only a few months old, on the night of 6th September 1870, the *Captain* was on passage through the Bay of Biscay with the Channel fleet, under reefed sail in a gale, when a severe squall capsized her with the loss of four hundred and seventy three officers and men; a disastrous end to an experimental ship, which dismayed the British public and checked turret ship development for several years.

Meanwhile the French were steadily building a fleet of armoured ships with generous freeboard and full sailing rigs. By 1869 Britain had twenty-nine armoured ships of which about eight were similar. France had twenty-six of eight similar types, several of which were being sent to foreign stations, leading to second class battleships being built by Britain to counter this threat to her colonies and trade routes. The 280ft *Audacious, Swiftsure* and *Triumph* were built with an amidship battery and came out during 1870-1 fully rigged, and the 9,270-ton first class rigged ironclad *Sultan* of 1871 had similar gun arrangements. After several years of reversion to muzzle-loading guns an attempt was made to reintroduce breech-loading in the British fleet but this failed from conservatism as did the attempts of naval constructors to abolish the sailing rig of new battleship construction for sea work.

However, during 1869 Edward Reed, a brilliant British naval constructor, directed design of the mastless turret ships *Devastation* and *Thunderer* – prototypes for the typical battleship at the end of the nineteenth century. The 285ft long *Devastation (Plate 3)* was well armed with four 35-ton guns in two round turrets, forward and aft of an amidship superstructure with bridge, funnels and mast. She had no secondary armament, was adequately armoured, and steamed at about 14 knots with twin screws which gave reliability and better manoeuvring

than the earlier single screw ironclads. She was a type suited to action in European waters and the Mediterranean. While her armour was proof against almost all contemporary shells, her guns could pierce any other ship's armour, and 1,800 tons of bunker coal gave her wide radius of action.

There was limited opposition to the *Devastation*'s low freeboard design when she was started in 1869, but the tragic loss of the low freeboard turret ship *Captain* caused serious questioning of her design although she had sufficient stability. Reed resigned and was replaced by Nathaniel Barnaby, and the *Devastation*'s trials were held in an atmosphere of cynical pessimisim. However, they were wholly successful. She proved herself a truly revolutionary sea-going battleship and confirmed Britain's lead in battleship design. The same year the French commenced construction of the "Colbert" class, battery or barbette type ships, with armoured wooden hulls, fully rigged, and comparing poorly with the *Devastation* or even the earlier *Monarch*.

However, Britain and most other fleets continued to build some fully-rigged battleships with an amidship armoured battery and Barnaby supervised the design of the graceful 9,490-ton *Alexandra*, laid down in 1873. Her gun arrangements were copied from the Austrian ironclad *Custozza*, designed four years before; large recesses in the ship's side allowed the amidships battery direct ahead or astern fire *(Plate 5)*. The same year the brig-rigged battleship *Temeraire* was started, with an amidship battery and a 25-ton gun mounted forward and aft in armoured redoubts which raised the guns hydraulically to the firing position after loading in protection below.

Battle fleets contributed little to the Franco-German war of 1870-1, except that the powerful French fleet blockaded German ports and secured unhindered passage of large French armies from North Africa to France.

At that time France was the only naval power which could seriously challenge Britain, as the Russian fleet, which was then thought certain to be allied to France in war with Britain, had few ironclads. The Russian Navy was deployed in two principal fleets, one in the Baltic, the other in the North Sea, with a squadron in the Far East. Russian battleship construction suffered even more than the French from changes in design policy, and political ties with France influenced the design of Russian warships for many years.

The American fleet was then largely composed of shallow draught monitors and a few cruising ships, but that nation was in no mood for fighting anyone.

Austria and Italy did not seriously develop their fleets after the war of 1866 and the Turkish fleet was probably the strongest in the eastern Mediterranean at the time. Spain had several ironclads and the Navy of the North German confederation had the 9,600-ton *Kŏnig Wilhelm* which was built in England in 1868 as one of world's most powerful warships. Japan was only awakening to western influence and had no large modern ships.

During the 1870's and 80's the British Admiralty and to some extent the French naval ministry attempted to restrict the size of battleships, not only for economy but for manoeuvrability and shallow draught work in European waters. However, as experience with operation of ironclads individually and in fleets increased, better judgements could be made and more rational ships emerged from the experimental excesses of the 1870's, when foreign gun developments and improved armour made ships obsolete before they were launched. Warship design was full of contradictions: big guns and thick armour versus moderate displacement; wide arcs of fire incompatible with masts and sails.

The mounting of heavy guns in an armoured redoubt was introduced, and soon developed to the full "barbette" system, with a revolving turntable inside the barbette, with the guns mounted on it. Gun and crew were unprotected from above, but it was thought to enable clearer sighting and better aim in action. Barbette mounting of battleship guns survived in many navies into the 1890's, as the weight of a turret was saved and guns could be mounted correspondingly higher without raising the acceptable centre of gravity of armament weights.

After the disastrous land war with Germany, France recommenced battleship construction in 1872 with the *Redoutable*, a 9,200-tonner which had a 14-inch armour belt, above which the sides tumbled in to a short amidship battery with 9½-inch armour. At each quarter of this a 38½-ton gun was mounted to fire through ports angled to permit broadside or longitudinal fire and two smaller guns were mounted on the deck above. She was fully rigged and was the first armoured ship to have steel framing. Her hull plating was of iron, with armour of steel and she had extensive internal subdivision.

Contemporary French battleships had exaggerated shape in the sides above water, sweeping in with "S"-shaped tumble home, which enabled the heavy guns to fire longitudinally with better effect and was thought to improve resistance to shell hits, but it complicated construction, decreased stability in some conditions and greatly reduced deck area. These ships differed in size, speed and armament and for almost thirty years most were experimental designs, difficult to work together as a fleet.

The 8,650-ton *Richelieu* of 1873 was the first French "central battery" ship, joined in 1875 by the *Colbert, Friedland* and *Trident;* similar but with differing armament and arrangement. The larger battleships *Foudroyant* and *Devastation* were laid down in 1876 and that year a new concept of barbette battleship was started, to be named *Admiral Duperre*. This 11,100-tonner had a complete waterline armour belt 21½-inches thick but was unprotected above. Despite having twin-screw, triple expansion engines and 14 knots speed, she was fully rigged. Two of the four 13.5-inch guns were carried in barbettes, sponsoned out at the sides forward,

allowing clear ahead fire. The other two guns were mounted in barbettes on the centreline before and abaft the mizzen. She also carried fourteen 5.5-inch broadside guns for attack of an adversary's unarmoured areas, besides many 3-pounders for defence against the new torpedo boats. Although the big guns were well above the waterline, affording good aim, the full rig was cumbersome and she was still an inferior type to the British *Devastation*.

The *Thunderer (Plate 4)* the second ship of the "Devastation" type of unrigged British battleship, was not completed until 1877. A third, the *Dreadnought*, was commenced in 1872 and completed in 1879. She was the first British warship to have artificial ventilation, so necessary at sea in these low freeboard ships.

Italy had become a naval power shortly after unification but at first ordered warships from abroad and to foreign designs. At the battle of Lissa in 1866, none of the Italian ships was built in Italy. However, when the government introduced a programme of naval development in 1872, some distinguished Italian naval architects emerged, with ideas in the forefront of international warship construction.

Italy was then in the same naval position relative to France as France was to Britain, and to compensate for her industrial and financial limitations Italy built very powerful individual ships with extremely heavy guns to smash any known armour and have high speed and sufficient radius and seakeeping to meet all comers in the Mediterranean.

Her most noted early designer was Benedetto Brin, whose first major warships were the 12,000-ton battleships *Duilio* and *Dandolo*, in which some armour protection was combined with the largest guns then carried at sea: two *en echelon* amidships turrets each mounting two 17.7-inch Armstrong guns, resulting in the most powerful battleships afloat. Trials of the 100-ton guns for the *Duilio* breached all available armour, but the Creusot company produced 22-inch thick steel plate which stopped the shell, so this was chosen for the new ships' protection, making Italy the first to use steel armour, which soon replaced wrought iron.

The *Duilio* and *Dandolo* were commenced in 1873 and prompted the design of the broadly similar British battleship *Inflexible* of 11,900 tons, with thicker armour and four 81-ton guns in two turrets. She was launched in 1876 and her armoured citadel was small compared to the unprotected ends, which were well divided into watertight compartments.

The *Inflexible* was the first British battleship to have submerged torpedo tubes, one at each bow. She steamed at 14¾ knots – a very slight advance on the *Warrior* of twenty years earlier. As a practical fighting ship she would have been vulnerable in action but this did not stop four smaller ships of the same type being built: the 8,510-ton *Ajax* and *Agamemnon* in 1876 and the 9,150-ton *Colossus* and *Edinburgh* in 1879 *(Plates 6 and 7)*. With twin turrets *en echelon* amidships, above an armoured area over the engine and boiler spaces and high, unarmoured superstructures at each end, these ships exemplified the instability of warship design caused by the constant development of guns and armour.

While Britain was building armoured "Inflexible" type ships, Benedetto Brin was discarding armour altogether in the large, fast, mastless and very heavily gunned battleships *Italia* and *Lepanto (Plate 8)*, which were 400ft long and displaced 13,480 tons. These ships were ordered in 1876 and construction included items from many European countries. The concept foreshadowed the battlecruisers of the early twentieth century in having minimal armour, mounting four 17.7-inch guns on *en echelon* turntable barbettes amidships and attaining a then unprecendented speed of almost 18 knots. Some credit for their conception was due to the discerning minister of marine, Admiral di Saint Bon, and they were principally intended for defence of the long and vulnerable Italian coast, for which provision was made to embark large numbers of troops in a prophetic "combined operations" role.

However, the next two Italian battleships, the "Andrea Doria" class *(Plate 20)*, reverted to the protection and lower speed of the "Duilio" type, though Italian constructors continued to produce battleships which did not conform to the emerging pattern of "pre-Dreadnought" battleship design until 1899, when the appropriately named *Benedetto Brin* was commenced, arranged with the by then conventional four 12-inch guns, disposed in paired turrets forward and aft.

Despite Italian innovation and concentration of force in four powerful battleships, Britain and France remained the two major naval powers in the early 1880's. The British fleet could rely on the strength of the turret ships *Inflexible*, *Dreadnought*, *Thunderer* and *Devastation* and the belt and battery types *Monarch*, *Neptune*, *Alexandra*, *Triumph* and *Superb* as being the finest first class battleships in the world and representing half of the type existing. They were greatly superior to the contemporary French *Admiral Duperre*, and to the *Devastation*, *Foudroyant* and *Redoutable*.

Britain had not quite such an advantage with second class battleships, but their French equals were smaller and timber-hulled, while France's natural allies, Russia and America, had not one second class battleship. As growing Germany had concentrated on a powerful short sea or coastal fleet of well protected and armed second class battleships, Britain was secure in her maritime supremacy.

Many naval officers and constructors thought ramming a powerful method of attack, reinforced by its success at Lissa, and most battleships had bows designed and strengthened for this. Its use was subsequently indecisive in war but was forcefully demonstrated by several notable peacetime accidents. In 1875 the British ironclad *Iron Duke* rammed the *Vanguard* in fog and sank her. Three years later the German battleship *König Wilhelm* rammed the battleship *Grosser Kurfürst* in the English Channel, due to helm confusion while avoiding a small vessel, and sank her with heavy loss of life.

Prior to 1864 the Prussian Navy comprised various minor warships intended for coastal and Baltic operation. Thereafter, the founding of the Germany Navy encouraged growth of a seagoing fleet. At first a few armoured ships were built in England and France but after the Franco-Prussian war, which raised German ambitions, a squadron of armoured ships was ordered. The *Kaiser* and *Deutschland* were built in England to designs of E.J.Reed and were conservative armoured frigates of the time, fully rigged and having a maximum speed of 14½ knots. Meanwhile, German shipyards were completing their first three major warships – the *Grosser Kurfürst*, *Friedrich der Grosse* and *Preüssen*, turret battleships which were fully rigged in contemporary fashion. The four "Sachsen" class of 1877 had six 10¼-inch breech-loading guns mounted in an armoured battery amidships, the ends of the ship being unprotected. These early German battleships mounted smaller guns than their foreign contemporaries but had improved protective armour.

In 1877 the British Navy had its first and only action experience until 1914 against an armoured ship when the unarmoured frigate *Shah* and the unarmoured corvette *Amethyst* fought the Peruvian turret ironclad *Huascar,* whose crew had mutinied and committed piracy on British shipping off the west coast of South America.

The *Huascar* had been designed on the principles of Captain Coles and was built by Lairds at Birkenhead in 1864 with a single turret mounting two 12½-inch guns. The *Shah* had two 12-ton and eight 6½-ton guns and some smaller. The *Amethyst* had a relatively light armament. Both had to keep steaming and maintain long-range fire as they were no match for the ironclad. After two hours and forty minutes the *Shah* had fired 241 rounds and made 30 hits, with about the same number by the *Amethyst.* As the *Huascar* was steaming at 11 knots and was hulled by six hits this was creditable shooting for the time. The *Shah* also fired the first torpedo used in action, at 400 yards range, but the *Huascar* could steam faster than it ran and left it astern! She then retired into shallow water and afterwards surrendered to Peruvian authorities.

Two years later the *Huascar* participated in a war between Peru and Chile in which the navies were prominent. In May 1879 she was caught between two squadrons of Chilean ships off Iquique, including the belt and battery ironclads *Blanco Encalada* and *Almirante Cochrane* – 3,500-tonners mounting three 12-ton guns on each side of their armoured batteries. These ships fired 76 shells at close range, of which 27 wrecked and disabled the *Huascar* causing her surrender. She is preserved as a Chilean naval relic at Talcahuano.

In 1860 Commander Luppis, an Austrian naval officer, devised a self-propelled torpedo and during 1864 engaged the assistance of Robert Whitehead, English manager of an engineering works at Fiume, in solving the technical problems to perfect it. This 14ft long, fish-shaped weapon was to revolutionise sea warfare and has developed constantly since.

In 1878 Thornycroft built the first practical British torpedo boat – a small fast steam launch discharging a torpedo from a tube forward and initiating a new and comparatively inexpensive attack craft which, if lucky, might damage or sink a large warship. These were ordered to counter large numbers of torpedo boats which had been built for the Russian Navy during the previous four years.

Torpedoes also appealed to French naval thought as a method of attacking a fleet and offsetting Britain's considerable advantage in modern battleships. Large numbers of torpedo boats were built, to attack in flotillas, preferably at night and against an anchored battle fleet. Britain continued to develop and build the type and experiment with torpedoes launched from above water carriages and tubes in new warships.

By 1875 British battleships were prepared for possible torpedo attack and were equipped with anti-torpedo nets of steel to be suspended on booms around the ship at anchor or at slow speeds. Searchlights, Gatling guns and guard boat patrols for anchorages were also used as torpedo boat defence.

The war between Russia and Turkey during 1877-8 caused a squadron of British ironclads to be deployed in the eastern Mediterranean and, when Constantinople became threatened, these were ordered to the Dardanelles. But it was the rapid movement of troops from India to concentrate at Malta in the Mediterranean, their movements covered by three ironclads, which forced a settlement of peace and caused Russia, that vast land power, to seek a powerful fleet to enforce her policies, though she had little ocean trade.

During the 1880's the term "ironclad" was dying out and "battleships" crystallised as a type in major navies. In the British fleet the decade saw the end of sail in warships, an end to experimental designs, and the commencement of naval strength founded on balanced battle squadrons, capable of seakeeping in all weathers and relying on gun power to conquer.

Reliable breech-loading guns were developed, made of steel and with high muzzle velocities and improved breech-closing mechanism. The British Navy re-adopted breech-loading after having reverted to muzzle-loading for some years. France had led for some time with breech-closing mechanism and the Italian Navy followed. Turkish and American ships continued with muzzle-loading for a few years, until their fleets were modernised.

The menace of torpedo boat attack stimulated development of the quick-firing gun as protective secondary armament for battleships and to provide a hail of fire at close range to damage unarmoured areas and demoralize an opponent's crew.

To counter first rate French ships, the British Admiralty laid down a series of battleships, commencing with the *Collingwood (Plate 10)*, in which the main guns were mounted in barbettes, enabling them to be carried higher as the weight of turrets was saved. The armour was

disposed amidships and generally she resembled an improved "Devastation" type, with displacement of 9,500 tons. The *Collingwood* mounted four 12-inch guns. The following four "Admiral" class ships, *Anson, Camperdown, Howe* and *Rodney (Plates 11-13)*, had four 13.5-inch guns and the later and similar *Benbow* two 16.25-inch monsters *(Plate 14)*. The ships had too limited a displacement, the armour was not sufficiently extensive and they were not considered ocean-going battleships, being very wet at sea.

In contrast, French designers retained ample freeboard in their large battleships, which forced the big guns to be mounted singly in barbettes. They also produced second class armoured coast defence ships which were not rigged and had low freeboard.

Britain was involved with the problems of the big gun, and the *Victoria* and *Sanspareil (Plate 16)*, laid down in 1885, had two 16.25-inch guns in a single turret, but the same armour protection as the "Admirals". The secondary battery were 6-inch guns. These ships were developed from the coast defence ships *Hero* and *Conqueror (Plate 9)* and the big guns had a satisfactory rate of fire for the unlikely chance of dealing a smashing shell at an enemy. In 1886 William White became Director of Naval Construction, succeeding Nathaniel Barnaby.

A year later the "improved" battleships *Nile* and *Trafalgar* were started, but were almost of monitor type *(Plates 17-19)* with short unarmoured ends and four 13.5-inch guns in two turrets. The great weight of these ships' armour and the restricted dimensions for manoeuvrability reduced their freeboard and the height at which the main guns could be mounted, contributing to the resignation of Naval Constructor Barnaby. However, they were probably more effective than contemporary French battleships, against which they were designed. In 1880 France was building a class of four: *Magenta, Marceau, Neptune* and *Hoche*, with less protection than their predecessors but with the same exaggerated tumble home to improve side longitudinal fire. Four 13.4-inch guns were mounted singly in barbettes; one forward, one aft and one each side amidships.

During the years 1870-1900 France had thirty-one different ministers of marine, each usually having different ideas. This caused French naval policy to change continually from a fleet intended to be capable of meeting the British battle fleet, to a huge torpedo boat force, or a cruiser and torpedo boat force for raiding commerce, backed by smaller coast defence battleships and torpedo boats. Others wished the fleet to be principally directed against Italy in the Mediterranean and Germany in the North Sea, with Austria and the Adriatic as a remote possibility. This confusion was worsened by the French dockyards' inability to build as quickly as British shipbuilders, or for a comparable price.

By 1886 French naval opinion had swung temporarily against battleships in favour of large numbers of seagoing torpedo boats for potential attack on the British fleet but after poor results with torpedo craft during annual French manoeuvres of 1887, held in bad weather, this trend was checked and gradually the French returned to faith in battleships as the major fleet force.

Victory

BRITISH FIRST RATE SHIP OF THE LINE 1778 *Plate 1*

Built	Royal Naval dockyard, Chatham
Laid down	July 1759
Launched	May 1765
Completed	1778
Dimensions	*Length,* figurehead to taffrail 226ft 6in
	Length of keel 152ft 3in
	Breadth 51ft 10in
	Depth of hold 21ft 6in
Displacement	2,162 tons
Armament	Thirty 32-pounder muzzle-loading. On lower gun deck
	Twenty-eight 24-pounders, muzzle-loading. On middle gun deck
	Thirty 12-pounders. On upper gun deck
	Twelve 12-pounders, muzzle-loading. On quarter deck
	Two 12-pounders, muzzle-loading. Two 68-pounder carronades, muzzle-loading. On forecastle
Complement	850
Designed	Thomas Slade, senior surveyor to the Royal Navy
Original cost	£57,748

Since 1805 the first rate ship of the line HMS *Victory* has symbolised Britain's naval strength and pride. Raised to fame as Admiral Nelson's flagship at the battle of Trafalgar, she remains preserved in dry dock at Portsmouth dockyard and still serves as the nominal flagship of the commander-in-chief Portsmouth.

The *Victory* was already an old ship when she fought at Trafalgar and had seen other actions.

In 1805 the British had finally succeeded in blockading the French Admiral Villeneuve in Cadiz. When Villeneuve came out to fight Nelson was commanding a fleet of twenty-seven ships; the French had a total force of thirty-three French and Spanish ships of the line.

At dawn on 21st October 1805 the two fleets were in sight, about twenty miles from Cape Trafalgar, thirty-miles south-west of Cadiz. Nelson signalled to attack, leading one line of the British fleet with *Victory*. Collingwood in the *Royal Sovereign* led the other. The light west wind allowed the British ships to bear down on the French and Spanish under full sail.

At 11.50 am the French fired on the *Victory*, and soon after the action

1 VICTORY, BRITISH FIRST RATE SHIP OF THE LINE, 1778

became general. Nelson ran up the signal, "Engage the enemy more closely", and as the *Victory* passed the *Bucentaure*, Admiral Villeneuve's flagship, she fired a close-range broadside into her which killed about four hundred men and disabled the ship. The *Victory* then went alongside the French *Redoutable*, both ships firing into each other. The British *Temeraire* came alongside the *Redoutable's* disengaged side while the *Victory* repeatedly fired broadsides into the French ship and at the same time her other side guns fired at the *Bucentaure* and the four-decked line of battleship *Santissima Trinidad*.

The French ship *Fougeux* came up and engaged the *Temeraire* on her other side and there were then four ships locked in close action. Twice the *Victory*'s guns were ordered to cease firing on the *Redoutable*, whose big guns were silent, but the many soldiers and marines in the tops and rigging of the *Redoutable* continued to pour out musket and rifle fire and one shot struck Nelson, who was carried below mortally wounded.

About twenty minutes after Nelson fell the *Redoutable* surrendered and two hours later Hardy was able to tell the dying Nelson that the French and Spanish fleets were captured, sunk or fleeing. Many of the fleeing survivors were afterwards intercepted and successfully fought by an English squadron off Cape Ortegal on November 4th.

The *Victory* returned to Portsmouth with Nelson's body on board, to a nation mourning for a hero. His victory at Trafalgar confirmed Britain's superiority at sea, and though the war did not end until 1815 and the French fleet was rebuilt and regained its offensive potential, the British Navy was not again seriously challenged for the next hundred years. Competition was to lie in the field of advancements in warship construction, and Britain's reputation enabled her to maintain a century of international freedom from large-scale wars at sea and to embark on her enormous industrial and economic expansion and the enlargement of her empire.

The *Victory* remains the only surviving ship of the line and although an old vessel in 1805, she typifies the three-decked first rate which was improved only gradually until steam auxiliary engines and single screws were installed in existing and new ships of the line in the 1840's. These remained the principal force of the British fleet until the iron-hulled steam "frigates" *Black Prince* and *Warrior* were built in 1859 to counter the French ironclad ship *La Gloire*, which had been completed the year before. The era of the ironclads had commenced and would radically change all concepts of sea war.

The *Victory* remained afloat until 1922 when, through the efforts of the Society for Nautical Research, she was docked and restored to her condition at the time of Trafalgar and remains a serving warship and a considerable attraction to the thousands who visit her annually in Portsmouth dockyard.

This photograph was taken in 1890 and shows the *Victory* on moorings in Portsmouth harbour, surrounded by Victorian warships, troopships and yachts.

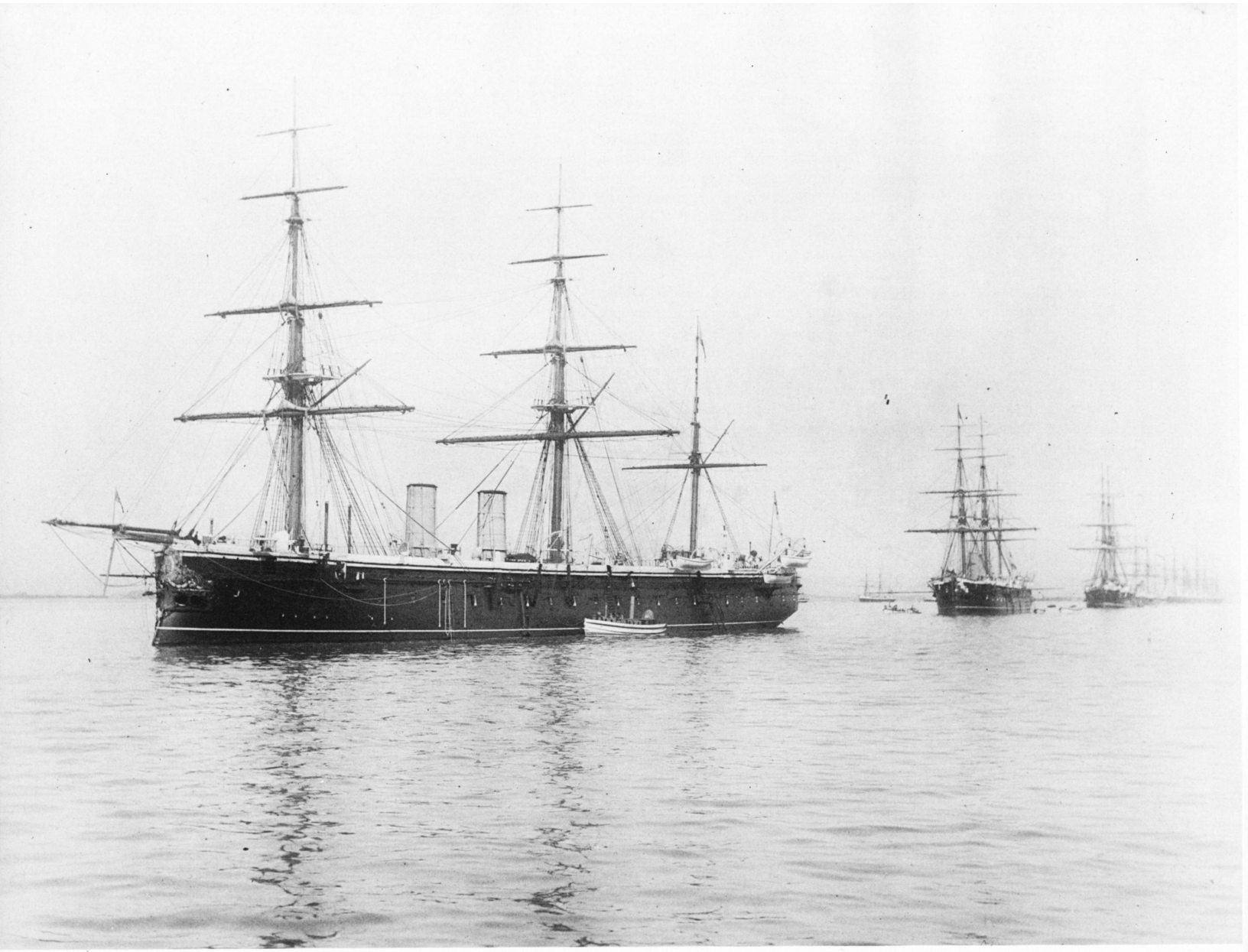
Minotaur

BRITISH 1865 *Plate 2*

Built	Milwall Shipbuilding Co., London
Laid down	1861
Launched	December 1863
Completed	1865
Dimensions	*Length between perpendiculars* 400ft
	Breadth 59ft 3in
	Draught 27ft full load
Displacement	10,690 tons
Machinery	Single screw
	2-cylinder trunk type engines by Penn
	58 revolutions per minute
	Ten rectangular, return fire-tube type boilers
	Speed 14¼ knots mean, on trials at full load
Bunkers	Coal. 750 tons
Endurance	1,500 miles at 7½ knots. 1,000 miles at 14¼ knots
Armament	*Original*
	Four 9-inch rifled muzzle-loading. On main deck broadside
	Twenty-two 7-inch rifled muzzle-loading. On main deck broadside
	Two 7-inch rifled muzzle-loading. One under forecastle. One under poop
	Eight 24-pounders. Saluting
	Re-armed 1875
	Fourteen 9-inch rifled muzzle-loading. On main deck broadside
	One 9-inch rifled muzzle-loading. Under poop
	Two 9-inch rifled muzzle-loading. Under forecastle
Armour	Wrought iron
	Belt 5½-inch amidships to 4½-inch at ends. Extending from upper deck to 5ft below waterline (Sufficient to resist contemporary shot)
Complement	705

The *Minotaur*, with her sister battleship *Agincourt* and the *Northumberland* of similar dimensions, were the longest major warships built with a single screw. They were also the only warships rigged with five masts and were identical except for machinery.

The *Minotaur*'s iron hull had a ram bow, a semi-circular and almost vertical stern above a low counter, a straight sheer and little tumble home in the sides. Her underwater lines were fine for contemporary warships and she was an excellent sea boat and steady gun platform, but was unhandy under steam and almost unmanageable under sail, except



18 *2 MINOTAUR, BRITISH 1865*

with the wind abaft the beam.

There were three complete decks – upper, main and lower – an open topgallant forecastle and a poop and sternwalk. She was divided by bulkheads below the main deck.

The Penn trunk engines were a successful and compact type which obviated piston rods and were installed in the majority of British battleships of that time. Maximum revolutions were 58, driving a 24ft-diameter, four-bladed propeller. The boilers were arranged in two rows, with stokeholds between them, and uptakes led to two telescopic funnels. As completed there was a steam capstan for weighing anchor but no other mechanical aids; the rest was square-rig seamanship.

The *Minotaur* and *Agincourt* were the worst sailers in the fleet. The five masts were at first known as fore, second, main, fourth, and mizzen. Originally the first four carried yards but these were removed from the fourth mast during her first commission. Afterwards the masts were renamed fore, second, main, mizzen and jigger. Her main truck was 153ft above deck and the lower yards were 91ft long. Despite a large sail area her best sailing speed was 9½ knots with wind abeam and the propeller disconnected. Two of the five masts were removed after 1877.

Although classed as a third rate ship of the line for purposes of complement, the *Minotaur* was a more powerful warship than the contemporary first rates. Her crew berthed on the main deck, between the guns – a system disliked by seamen accustomed to the close atmosphere of the orlop deck berthing then common, as mess tables and gear had to be cleared away for quarters and drills, disturbing the watch below. As there were no transverse battery bulkheads, the ships were open from end to end and the seven hundred men berthing there made it a striking scene at mess times. However, many additional crew were found to be necessary for handling the rig and the number of guns and there were often eight hundred on board. The officers' accommodation remained on the ill-ventilated and badly lit lower deck and would have been better arranged in the half deck, aft.

The *Minotaur* was ordered as the *Elephant*, but her name was altered while building. Launched in December 1863, her completion was delayed two years by design changes. For the next eighteen months she carried out experimental trials and was altered in rig and armament. Many types of new, heavy gun mountings were tried on board for general service use.

She was commissioned into the fleet as flagship of the Channel squadron under command of Rear-Admiral Warden, and for the whole of her eighteen years in commission served as a fleet flagship; a unique career. As principal seagoing flagship in home waters she attracted considerable attention, and royalty and other important visitors were frequently on board.

Her sister *Agincourt* was built at Birkenhead by Laird and spent most of her active life as leader of the second division, on the starboard beam of the *Minotaur*. *Minotaur*'s original hydraulic steering gear proved unreliable and she was steered by hand until steam gear was fitted after two commissions. Despite her unhandiness she was only once involved in a manoeuvring incident, almost ramming the battleship *Bellerophon*.

Both the *Minotaur* and *Agincourt* were of impressive appearance and although their careers were uneventful, their existence affected the policies of foreign fleets. The *Minotaur* saw no action; she arrived one day late for the bombardment of Alexandria, so missing the only fleet action for half a century. However, some of her crew participated in the following naval brigade operations ashore, and the *Minotaur's* crew led the march past of the United Services at the Queen's review at the end of the Egyptian campaign.

From 1867 to 1873 she was continuously in commission, successively flying the flags of Admirals Warden, Symons, Yelverton, Wellesley and Hornby. During 1873 she paid off for refit and rearming, and in 1875 recommissioned as a flagship for twelve more years of sea service under Admirals Seymour, Hay, Hood, the Duke of Edinburgh, De Horsey, Fellowes and Hewett.

During the 1875 refit the *Minotaur* was fitted with the first searchlight in the British fleet, and later had the first type of Whitehead torpedo and tubes added.

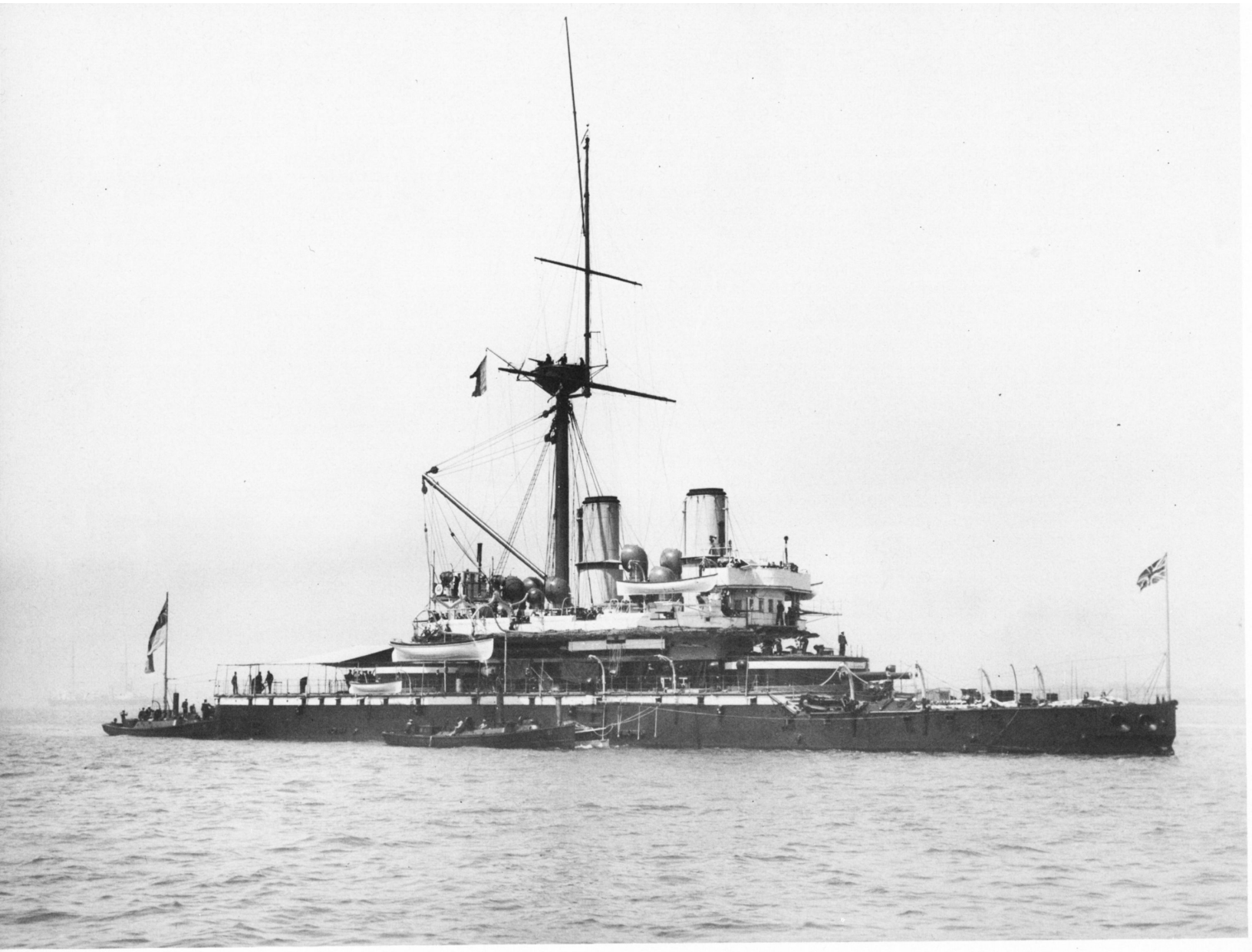
Her last appearance at an historic event was on June 23rd 1887 when, although obsolete, she headed the southern line of ships at Queen Victoria's Jubilee review at Spithead, where this photograph was taken. She had been twenty-two years afloat and at the end of the year was paid off and relegated to the non-effective list.

In 1893 the *Minotaur* was converted for subsiduary training duties, and served in this way for the next twenty-nine years. During 1922 she was sold to be broken up.

Devastation

BRITISH 1873 *Plate 3*

Built Royal Naval dockyard, Portsmouth
Laid down November 1869
Launched July 1871
Completed April 1873
Dimensions *Length* 285ft
Breadth 62ft 3in
Draught 27ft 6in mean
Displacement 9,330 tons
Machinery Twin screw
Two, direct acting, 2-cylinder trunk type engines by Penn
Eight rectangular boilers
IHP natural draught = 6,650 = 13.84 knots



20 *3 DEVASTATION, BRITISH 1873*

	Speed 12.5 knots
Bunkers	Coal. 1,800 tons
Endurance	4,700 miles at 10 knots
Machinery	Altered 1891-2
	Two inverted, triple expansion engines
	Cylindrical tubular boilers
	IHP natural draught = 5,500 = 13.2 knots
	IHP forced draught = 7,000 = 14.2 knots
Bunkers	Coal. 1,200 tons
Armament	*Original*
	Four 12-inch 35-ton rifled muzzle-loading guns. Two in each turret, forward and aft. Improved Armstrong type. Projectile. 706 pounds
	Re-armed 1891
	Four 10-inch breech-loading guns. Two in each turret
	Six 6-pounder quick-firers
	Fourteen smaller guns
Armour	Iron
	Belt 12-inch – 10-inch – 8½-inch
	Turrets 14-inch – 10-inch
	Magazines 5-inch
	Deck 2-inch – 3-inch
	Conning tower 9-inch – 6-inch
Complement	358

During the period of mid-nineteenth century changes in warship design the success of the "Monitor" principle of armoured, mastless turret ships of moderate draught, devised during the American civil war, was observed closely by all navies, but British naval opinion remained divided. Conservatives wished to retain broadside mounted guns and fully rigged steamships; others backed the turret system of gun mounting which could reduce the armament of a battleship to two or four heavy guns capable of almost all round fire.

The sea-going turret ship *Devastation* was designed in 1868 by E.J. Reed. He impressed the Admiralty with his clean designed, armoured battleship mounting only four large guns, but before the *Devastation* was launched rival factions "proved" she would turn out to be a costly failure. However, she and her near sister ships *Thunderer* and *Dreadnought* were still giving excellent service twenty years later.

The *Devastion*'s turrets worked on the Coles principle of rollers fitted at the circumference of the turret bases. Two 30-ton Armstrong guns of improved types were mounted in each turret. Following the capsize of the masted turret ship *Captain*, the *Devastation* was altered during construction to increase amidship freeboard to about 12ft. When in seagoing trim her upper deck was only 4ft 6in above the waterline, except forward where a "sunk forecastle" increased the height to 9ft. The turret ports were 13ft above the water so the guns were carried higher than in contemporary broadside ships, where they were usually 11ft above water.

The *Devastation*'s rolled iron armour was about seven times more effective than that of the first British ironclad *Warrior* of 1860. Her engines were the largest then built for a twin-screw ship and she was well compartmented and had a steel ram. As designed, two signal masts were to be stepped, one forward and one aft of the turrets, but she was finally more sensibly completed with one "military" mast stepped on the superstructure, the first of its kind.

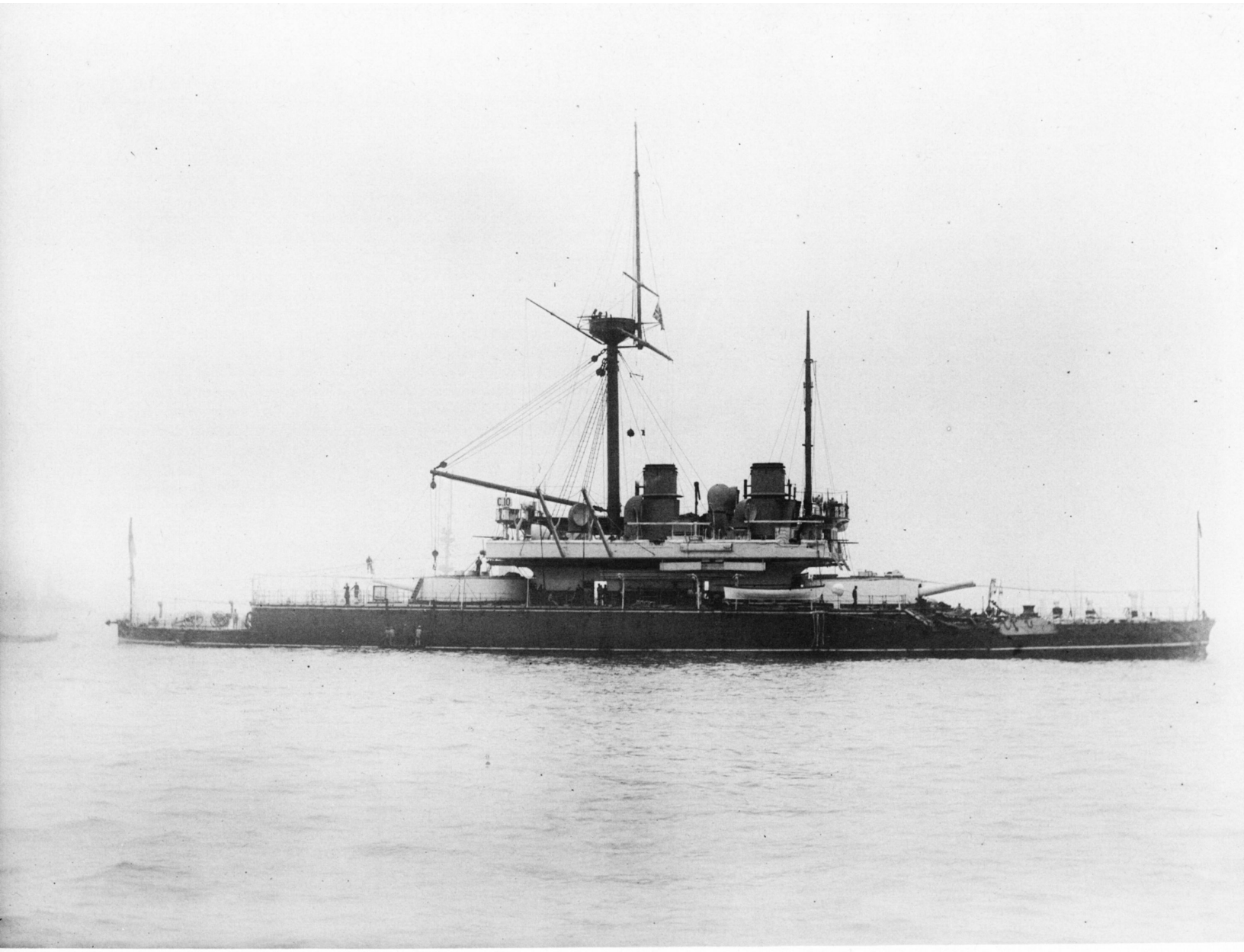
She was commissioned during January 1873 for special service and was attached to the Channel fleet for sea trials in company with the rigged battleships *Agincourt* and *Sultan*. Although the *Devastation* shipped seas more readily than the broadside ships with greater freeboard, she pitched less and rolled no more, besides being a more powerful fighting ship. The trials were considered to be successful and Reed was vindicated, though he had by this time left Admiralty employment.

From May 1874 until April 1875 the *Devastation* served with the Channel fleet and was rammed by the battleship *Resistance* off Portland in July 1874. The *Devastation*'s armour was displaced but unbroken, and after refitting she joined the Mediterranean fleet, where her poor ventilation was hard on the crew. During November 1878 she returned to refit at Portsmouth, when searchlights, Nordenfelt guns and Whitehead torpedoes were fitted. On completion she was in reserve until April 1885 when she commissioned for special service with Admiral Hornby's "evolutionary squadron". She became portguard ship at Queensferry from August 1885 until May 1890, but took part in the 1887 Jubilee naval review at Spithead and suffered collision with the battleship *Ajax* immediately before it.

The *Devastation* underwent a lengthy refit at Portsmouth during 1891-2, being re-armed with four 10-inch breech-loading guns, two in each turret.

From 1893 until January 1898 she was port guardship at Devonport and then remained there in reserve until April 1898 when she sailed for Bantry, Ireland, to become coastguard ship until June. She then returned to the reserve at Devonport. From November 1898 to April 1902 she was port guardship at Gibraltar, but spent much time actively at sea with the fleet.

The *Devastation* returned to reserve at Portsmouth during April 1902 and was declared non-effective in 1905. In May 1908 she was sold for £21,700 to be scrapped. The photograph was taken in about 1896.



22 *4 THUNDERER, BRITISH 1877*

Thunderer

BRITISH 1877 *Plate 4*

Built	Royal Naval dockyard, Pembroke
Laid down	June 1869
Launched	March 1872
Completed	May 1877
Dimensions	*Length* 285ft
	Breadth 62ft 3in
	Draught 27ft 6in mean
Displacement	9,330 tons
Machinery	Twin screw
	Two horizontal direct-acting engines by Humphrey and Tennant
	Eight rectangular boilers
	IHP natural draught = 6,270 = 13.4 knots
	Maximum speed 12.5 knots
Bunkers	Coal. 1,600 tons
Endurance	4,700 miles at 10 knots. 2,700 miles at 12½ knots
Machinery	Altered 1891
	Two inverted triple expansion engines by Maudslay
	Cylindrical boilers
	IHP natural draught = 5,500 = 13.2 knots
	IHP forced draught = 7,000 = 14.2 knots
Bunkers	Coal. 1,200 tons
Armament	*Original*
	Two 12.5-inch 38-ton rifled muzzle-loaders. In forward turret.
	Two 12-inch 35-ton rifled muzzle-loaders. In turret aft
	Re-armed 1891
	Four 10-inch breech-loaders. Two in each turret
	Six 6-pounder quick-firers
	Eight 3-pounder quick-firers
	Four machine-guns
	Two 14-inch diameter torpedo tubes. Submerged
Armour	Iron
	Belt 12-inch – 10-inch – 8½-inch
	Turrets 14-inch – 10-inch
	Magazines 5-inch
	Deck 2-inch – 3-inch
	Conning tower 9-inch – 6-inch
Complement	358
Hull	Wood sheathed and coppered

The *Thunderer* took almost nine years to complete. Opinion had swung against these "mastless seagoing monitors" as they were derisively called, which accounted both for the *Thunderer*'s delay and for the building of a number of retrograde central battery and fully rigged battleships. The *Thunderer* differed from the slightly earlier but very similar *Devastation* in mounting two 38-ton, 12.5-inch guns in the forward turret and two 12-inch in the after one. The turrets were rotated by hydraulic machinery powered by steam engines.

She was an unlucky ship. An explosion occurred in one of her boiler-rooms during trials in July 1876 and delayed her completion still further. In May 1877 she was commissioned in the reserve fleet, subsequently serving in the "particular service" squadron of the Channel fleet during June-September 1878. She was then fitted with 16-inch diameter torpedoes of experimental type and sailed for the Mediterranean later in the year. On January 2nd 1879 she suffered a gun explosion which killed eleven men and wounded thirty. The 12.5-inch guns were loaded by rotating the turret so the muzzles, which were run in and fully depressed, aligned with two loading tubes raking up from the deck below into the turret. A hydraulically-operated rammer forced the shell and the cartridge up the tube and into the muzzle. Following a misfire the gun had been mistakenly loaded with a second shell and charge, leading to its bursting on firing.

In 1881 the *Thunderer* went into reserve at Malta, where 14-inch diameter torpedo tubes were fitted and the charthouse was enlarged. She continued to serve in the Mediterranean fleet during 1885 and 1886, returning to Chatham to pay off for refitting. In January 1888 she was placed in reserve at Portsmouth and during 1889-91 was thoroughly refitted. Like the similar ships *Devastation* and *Dreadnought (Plate 3)* she was in advance of her time when she was built and could still be considered a useful ship. Four 10-inch breech-loading guns were installed in her turrets and smaller guns were also fitted.

In March 1891 the *Thunderer* returned to the Mediterranean fleet, but constant trouble with her boiler tubes resulted in her being ordered back to England, where she paid off into reserve at Chatham during 1892.

In 1894 her superstructure was painted in black and white chequers, like the warships of Nelson's time. Considerable latitude was still allowed in painting ships' upperworks at this time, though hull colours had been standardized.

In May 1895 the *Thunderer* became port guardship at Pembroke, remaining there until December 1900 when she returned to fleet reserve at Chatham. A refit during 1903 was followed by her being declared non-effective in 1907 and she transferred to Portsmouth to be sold. In July 1909 she was purchased for £19,700 to be broken up.

This photograph was taken about 1899. The *Thunderer* could be distinguished from her sister ship *Devastation* by her shorter funnels.

Alexandra

BRITISH 1877 *Plate 5*

Built	Chatham dockyard
Laid down	March 1873
Launched	April 1875
Completed	January 1877
Dimensions	*Length* 325ft
	Breadth 63ft 4in
	Draught 26ft 6in maximum
Displacement	9,490 tons
Machinery	Twin screw
	Two 3-cylinder vertical compound engines by Humphrys, Tennant and Co
	Twelve cylindrical boilers
	Trial speed 15 knots
Bunkers	Coal. 670 tons
Endurance	3,800 miles at 8 knots
Armament	*Original*
	Two 11-inch 25-ton rifled muzzle-loading. 540-pound shell. On carriages and skids
	Ten 10-inch 18-ton rifled muzzle-loading. 400-pound shell
	Six 13 cwt breech-loading
	Four launching carriages for torpedoes
	Re-armed 1891
	Four 9.2-inch breech-loading
	Eight 10-inch rifled muzzle-loading
	Six 4.7-inch quick-firers
	Re-armed 1897
	Four 9.2-inch
	Eight 10-inch rifled muzzle-loading
	Six 4.7-inch quick-firers
Armour	*Belt* 12-inch amidships. 6-inch at ends. 10ft 6in wide
	Battery sides. 8-inch upper tier
	Upper transverse bulkheads 6-inch
	Lower transverse bulkheads 8-inch forward. 6-inch aft
	Battery division 6-inch
	Engine-room aft bulkhead 5½-inch
Complement	665. Later 685

Like many major warships in that period of rapid change in ships and armament the *Alexandra* was designed as an individual ship. She was the largest, fastest and longest serving of the eighteen central-battery ships which formed the backbone of the British Navy during its transition from the full broadside armoured vessels with many light guns, to the turret battleships.

She had moderately fine lines with a full midship section and almost vertical sides, steered well and was a steady sea boat. Deck space was restricted due to the recesses in its breadth to allow gun traverse from the upper battery. The battery divided the berthing and storage areas in two. Most of the crew berthed forward of it and some, with the marines, in the battery itself, between the guns. The stokers' messes were on the forward lower deck. The main deck abaft the battery was officers' accommodation which was superior to that of most earlier ships. In contrast, the crews' quarters were inferior.

Her main armament was mounted in an armoured citadel amidships, on two decks; an arrangement known as the "central battery" principle. The *Alexandra*'s battery was unusual in having two decks, embrasured to afford ahead fire.

The central battery system reduced the extent of side armour required but restricted and congested the methods of ammunition supply from the magazines, which could not be placed beneath the battery due to the boiler-rooms being sited there, so ammunition had to be manhandled along passageways to the battery hoists, along with the powder charges.

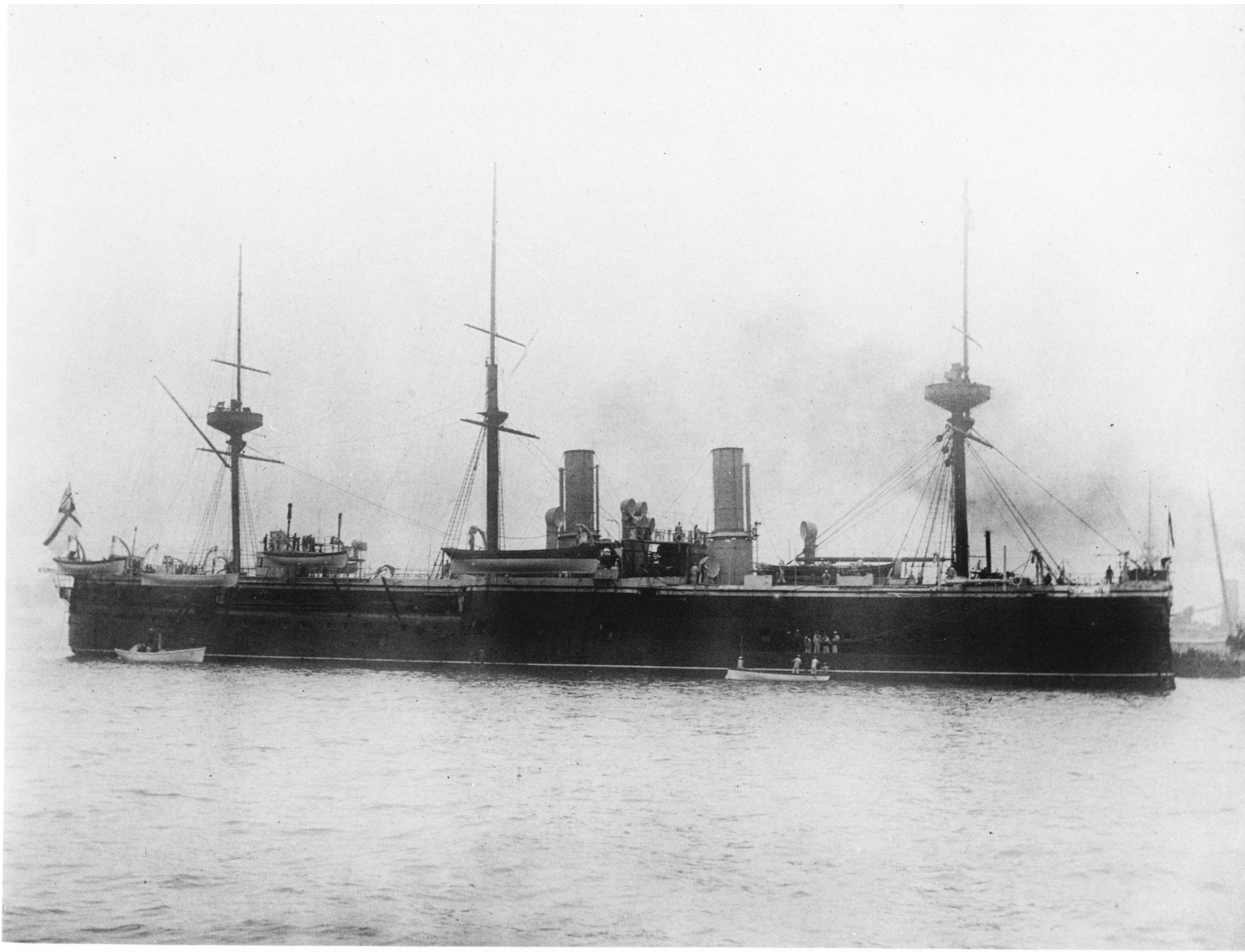
The battery had a slice cut off each corner for a gun port. The two 11-inch guns were mounted forward and the two 10-inch aft. The remaining 10-inch guns were the main deck or lower tier armament. The battery had arcs of fire from four guns ahead, six on each beam and two astern, but only half the total could be concentrated on one target.

During a refit the four muzzle-loading guns in the upper battery were replaced by 9.2-inch breech-loaders on carriages. These had double the range and rate of fire. Secondary batteries, later developed in battleships, were then unknown and the *Alexandra* typically mounted a few small guns as defence against attack by spar torpedo boats or boarding.

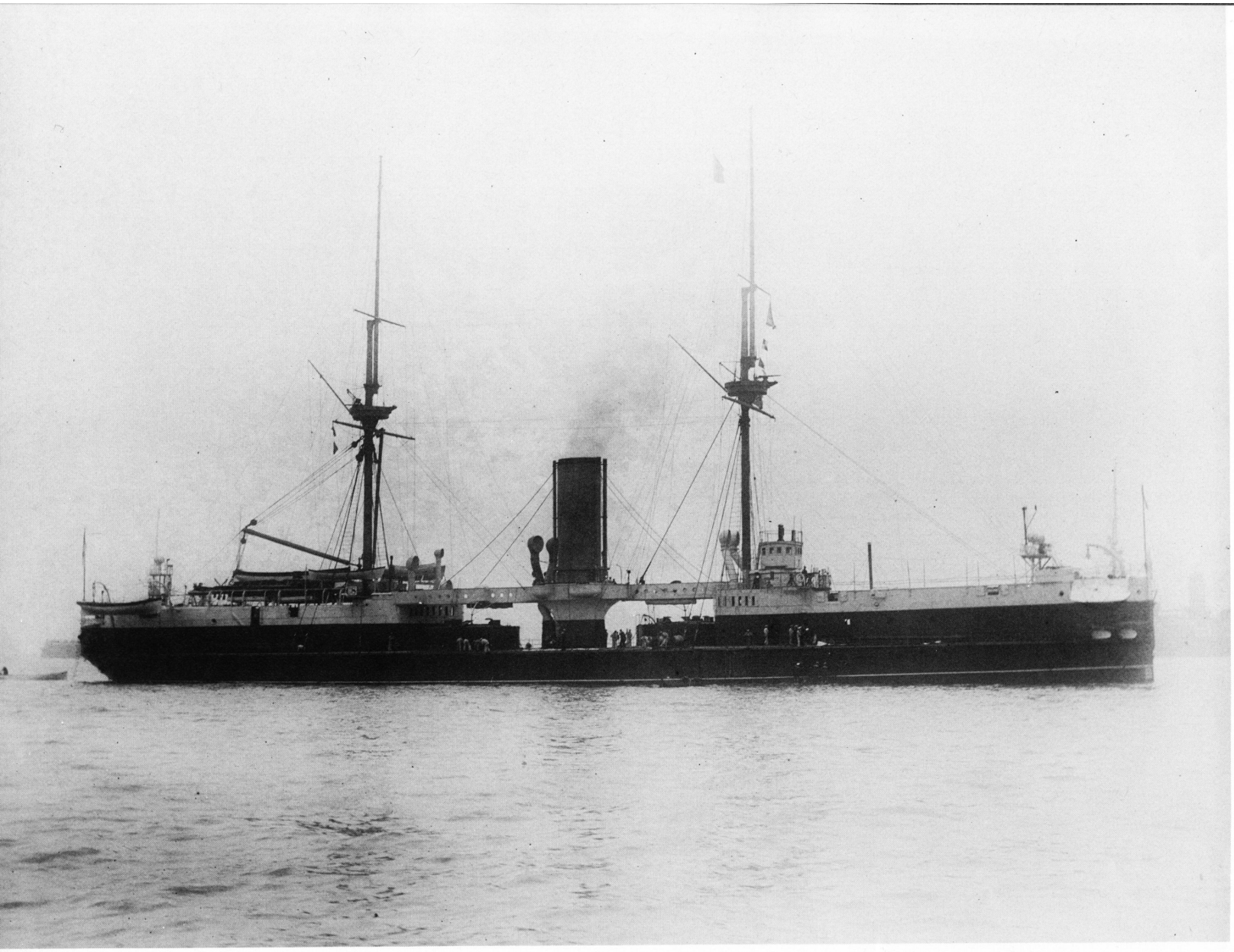
The *Alexandra* was the world's fastest battleship when new, exceeding 15 knots on trials, unapproached by any comparable ship for ten years. She and the *Dreadnought* were the first two battleships to have vertical compound engines and cylindrical boilers, doubling steam pressures to 60 pounds per square inch. A steam capstan and steering engine were fitted.

Her barque rig was insurance against seagoing machinery breakdown. It had great breadth to height and set about 27,000 square feet, but like many twin screw ships she was a poor sailer, never achieving more than 6 knots.

The *Alexandra* was named by Princess Alexandra, wife of the Prince of Wales, later King Edward VII. Commissioned for sea in February 1877 she sailed under Vice-Admiral Hornby as flagship of the Mediterranean fleet, and did not return to England for twelve years. Her arrival in the Mediterranean coincided with a threat by Russia to occupy Turkey and seize the Dardanelles, so for two years the British fleet was based on the roadstead of Besika Bay, in constant readiness to proceed to the Dardanelles if the Russians attacked. When this finally occurred the *Alex-*



25 *5 ALEXANDRA, BRITISH 1877*



26 *6 COLOSSUS, BRITISH 1886*

andra led six British battleships through the straits in a severe snowstorm, which caused her to ground, but she got off with assistance from the battleship *Sultan*. When this force arrived off Constantinople, the Russians were induced to make a political settlement, and while negotiations proceeded the British fleet was stationed in the Sea of Marmora, all being relieved at intervals except the *Alexandra*. They finally withdrew in 1879.

The *Alexandra* cruised the Levant and paid off at Malta during 1880, to recommission with a new crew sent out from Britain. Hornby was succeeded by Sir Beauchamp Seymour. At the end of this commission, in 1884, there was an army rebellion in Egypt and the British Mediterranean fleet anchored off Alexandria to receive British and European refugees. When a demand for the withdrawal of Eygptian troops from Alexandria was ignored, on July 11th 1882, the fleet bombarded the forts, Seymour transferring to the lighter draught battleship *Invincible* for the attack. The *Alexandra* fired the first shot and fierce firing went on for nine hours until the forts were silenced and the city was evacuated by the Egyptians. The *Alexandra* was hit thirty-four times and suffered damage to boats and gear, losing one man killed and three wounded, but her armour was unpierced. A party of her officers and men subsequently embarked in Nile steamers to participate in the attempted relief of Khartoum.

The *Alexandra* paid off at Malta and again recommissioned there with a fresh crew sent out in March 1886. The Duke of Edinburgh became commander-in-chief Mediterranean, and Prince George, later King George V, was one of her lieutenants. She was then painted white to minimise heat discomfort. During 1887 the *Alexandra* led an international squadron blockading Greek ports to prevent a war between Greece and Turkey. In May 1889 she sailed for England to pay off and was refitted at Chatham until February 1891, altered in armament and rig. She then commenced a period of continuous service in home waters as flagship of Rear-Admiral Fitzroy, commanding the first reserve fleet based at Portland, but only putting to sea for the summer cruise or for fleet manoeuvres or routine gunnery practice. She continued in this service under successive admirals and participated in the Diamond Jubilee naval review of 1897, when this photograph was taken, appearing as the sole survivor of her type.

During 1901 the *Alexandra* paid off at Chatham to be disarmed and placed in low catagory reserve for use as a mechanical training ship. She was broken up in 1908.

Colossus

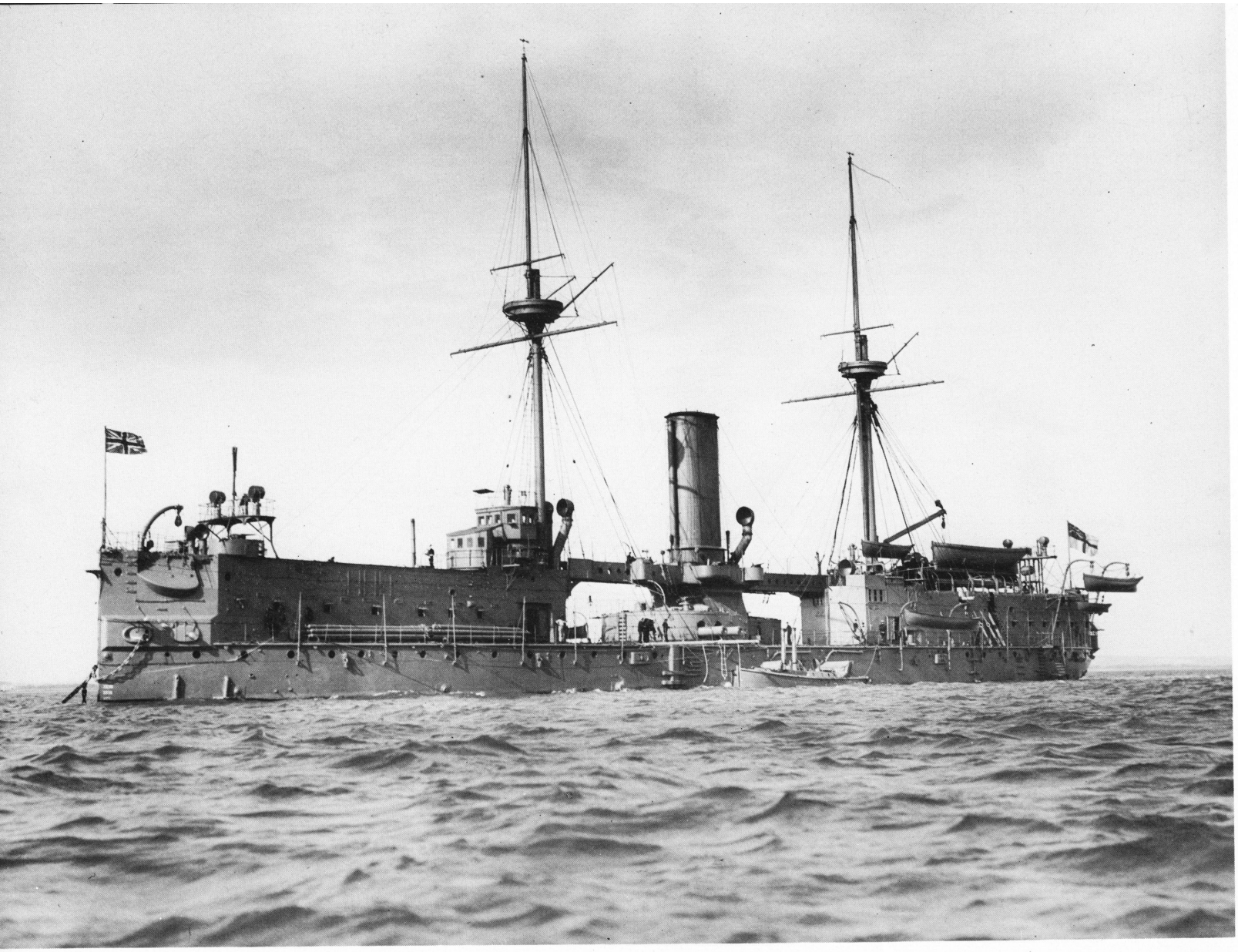
BRITISH 1886 *Plate 6*

Built	Royal Naval dockyard, Portsmouth
Laid down	June 1879
Launched	May 1882
Completed	October 1886
Dimensions	*Length* 325ft
	Breadth 68ft
	Draught 25ft 9in mean
Displacement	9,150 tons
Machinery	Twin screw
	Two 3-cylinder vertical, inverted compound engines by Maudslay
	Ten elliptical boilers
	IHP natural draught = 5,500 = 14.2 knots
	IHP trials = 7,488 = 16.5 knots (light condition)
Bunkers	Coal. 850 tons normal. 950 tons maximum
Endurance	6,200 miles at 10 knots
Armament	*Original*
	Four 12-inch 25 calibre 45-ton breech-loading guns. Two in each turret
	Five 6-inch breech-loading quick-firers
	Added later
	Four 6-pounder quick-firers
	Ten 3-pounder quick-firers
	Two 14-inch diameter torpedo tubes above water
Armour	Compound
	Citadel 18-inch – 14-inch. 108ft long by 15ft 6in broad
	Bulkheads 16-inch – 13-inch
	Turrets 16-inch – 14-inch
	Deck 3-inch – 2½-inch
	Conning tower 14-inch
Complement	396

The *Colossus* and her sister ship *Edinburgh (Plate 7)* were the first British battleships to mount breech-loading main guns, the first to have compound armour in place of iron, and the first to be generally constructed of steel. The four 12-inch guns were carried in two turrets placed *en echelon* on an armoured "citadel" amidships. Forward and aft of this a forecastle and poop extended to stem and stern, with flying bridges above the turrets to the funnel casing, giving these ships a distinctive and peculiar appearance.

The *Colossus* took over seven years to build and cost £661,716. She commissioned at Portsmouth in 1886 for special service, joining the Channel fleet in August for further trials. During October she was detached for special duties and after being formally accepted, sailed for the Mediterranean in April 1887, remaining there for six years.

The *Colossus* returned to become coastguard ship at Holyhead in November 1893 until she was paid off into the fleet reserve at Portsmouth in 1901. The photograph of her in Victorian livery was probably taken



28 *7 EDINBURGH, BRITISH 1887*

when she attended the naval review at Spithead in 1897.

She was transferred to dockyard reserve in 1902 but in July 1904 refitted to become tender to HMS *Excellent*, the naval gunnery school at Portsmouth. In August 1904 she acted as guardship in Cowes Roads. The *Colossus* was offered for sale in September 1906 and was sold for £18,500 in October 1908 to be scrapped.

Edinburgh

BRITISH 1887 *Plate 7*

Built	Royal Naval dockyard, Pembroke
Laid down	March 1879
Launched	March 1882
Completed	July 1887
Dimensions	*Length* 325ft
	Breadth 68ft
	Draught 25ft 9in mean
Displacement	9,150 tons
Machinery	Twin screw
	Two 3-cylinder vertical inverted compound engines by Humphrys and Tennant
	Ten elliptical boilers
	IHP natural draught = 5,500 = 14.2 knots
	IHP trials = 6,808 = 16 knots (light condition)
Bunkers	Coal. 850 tons normal. 950 tons maximum
Endurance	6,200 miles at 10 knots
Armament	*Original*
	Four 12-inch 25-calibre 45-ton breech-loading guns. Two in each turret
	Five 6-inch breech-loading quick-firers
	Added later
	Four 6-pounder quick-firers
	Ten 3-pounder quick-firers
	Two 14-inch diameter torpedo tubes above water
Armour	Compound
	Citadel 18-inch – 14-inch. 108ft long by 15ft 6in broad
	Bulkheads 16-inch – 13-inch
	Turrets 16-inch – 14-inch
	Deck 3-inch – 2½-inch
	Conning tower 14-inch
Complement	396

The *Edinburgh* ran trials during September 1883, proving, like her sister *Colossus (Plate 6)*, to have poor manoeuvring characteristics and a large turning circle. Both ships were unsteady gun platforms and with the 12-inch guns trained abeam in a seaway the muzzles were frequently rolled into the waves. Delivery of her guns was delayed and the *Edinburgh* first commissioned at Portsmouth for the Jubilee naval review of 1887 and sailed for the Mediterranean in September, remaining there until January 1894. In February 1894 she became coastguard ship at Hull but was soon transferred to Queensferry.

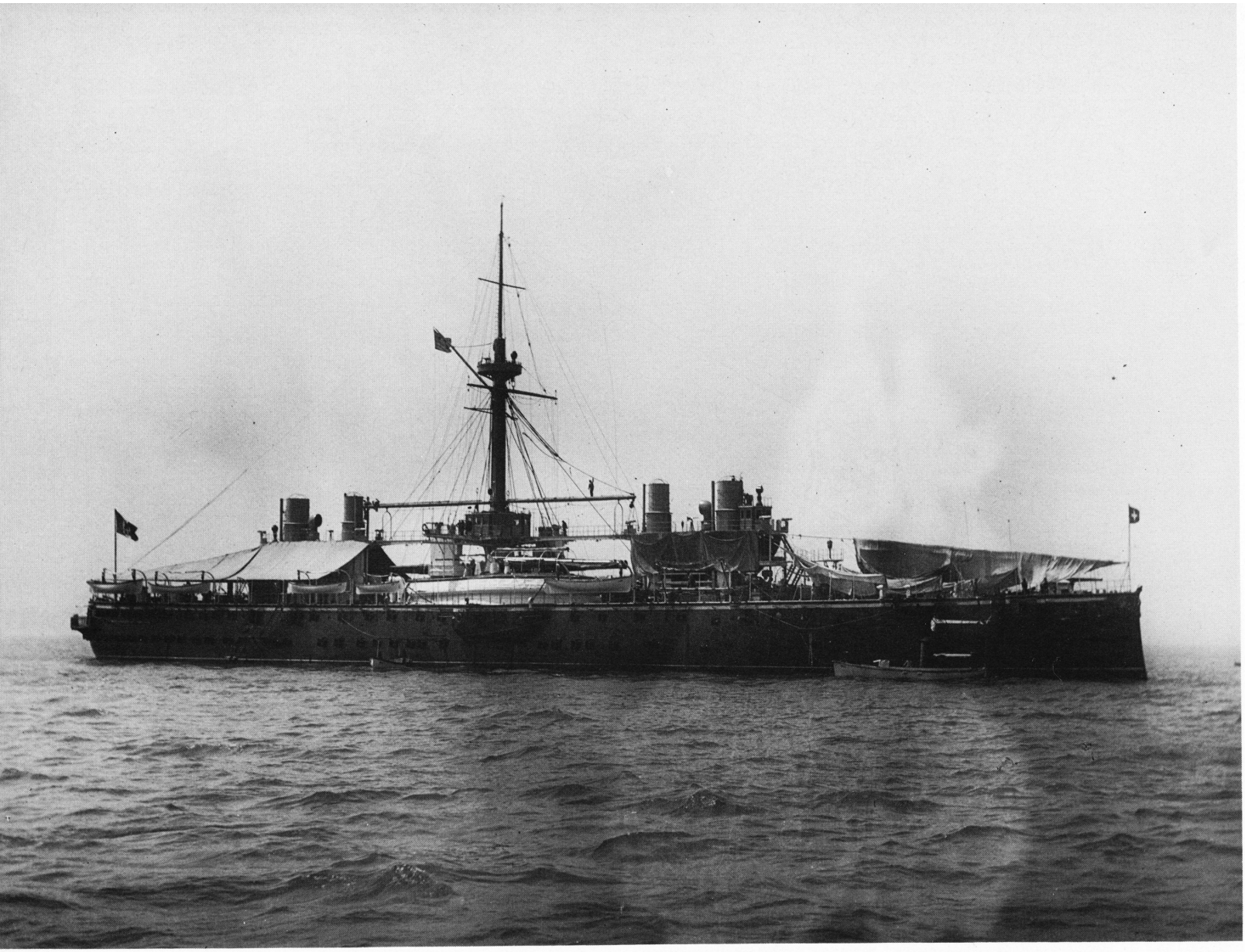
During September 1897 the *Edinburgh* went into fleet reserve at Chatham and was partially reconstructed. In May 1899 she became temporary flagship at the Nore and in October commenced service as gunnery tender to HMS *Wildfire* at Sheerness. In 1905 she was transferred to special reserve at Chatham. This photograph was probably taken about 1902.

In 1908 the *Edinburgh* was used as a fleet gunnery target in the Channel, being fitted with sample armour plating and subjected to more devastating gunfire than she would have had to endure as an active warship. She proved remarkably durable and was towed back to Portsmouth with her ends little damaged and on an even keel.

Lepanto

ITALIAN 1887 *Plate 8*

Built	Orlando, Livorno
Laid down	October 1876
Launched	March 1883
Completed	August 1887
Dimensions	*Length waterline* 400ft 3in
	Breadth 75ft 6in
	Draught 31ft 2in mean. 33ft maximum
Displacement	15,900 tons
Machinery	Twin screw
	Four 3-cylinder vertical compound engines. Two on each shaft
	Sixteen locomotive type boilers. Eight oval
	IHP forced draught = 15,797 = 18.4 knots (on trials)
Bunkers	Coal. 1,650 tons normal. About 3,000 tons maximum
Endurance	5,000 miles at 10 knots
Armament	*Original*
	Four 17-inch 102-ton Armstrong guns. 27 calibre. In pairs in *en echelon* barbettes
	Eighteen 6-inch. 26 calibre
	Four 14-inch torpedo tubes above water
	Later amendments
	Four 17-inch



30 *8 LEPANTO, ITALIAN 1887*

	Eight 6-inch (modified to quick-firers)
	Four 4.7-inch quick-firers
	Twelve 6-pounder quick-firers
	Twenty-eight 1-pounders
	Two machine-guns
Armour	Compound. No side armour on hull
	Redoubt for main guns 18-inch
	Hoist amidships 18-inch
	Funnel bases 16-inch
	Protective deck 3-inch
Complement	744

Following two already unusual battleships, the *Duilio* and *Dandolo*, the Italian Navy ordered the *Italia* and *Lepanto*, two ships of revolutionary design which were to dominate thought on large warships for several years.

The requirements were for a steel-hulled battleship, faster and more seaworthy than the "Duilio" type, with an armament superior to any then afloat. These ships had also to be capable of carrying a large number of troops in an unusual anti-invasion role. They were prophetic craft, foreshadowing the battlecruiser and the present commando ships.

The *Italia* and *Lepanto* were designed under the direction of Benedetto Brin, one of several brilliant naval architects produced by Italy. The design accepted that no armour could withstand very large guns and the customary belt and citadel armour was not fitted, so that only the heavy gun positions, ammunition hoists, funnel bases and lower protective deck were armoured. The 3-inch thick deck was carried 6ft below the waterline, with bunker coal stowed above it as further protection. A large armoured barbette was arranged amidships, diagonally across the deck, with two 17-inch guns mounted on turntables at each end, 33 feet above the waterline. These very large weapons could fire only one shell every five minutes and the adjacent 6-inch secondary guns could not be worked while they were in use.

The *Lepanto* cost about £1,200,000 in contemporary value. Her designed displacement of 13,850 tons was later increased to 15,000 tons and bunker capacity was modified to 1,700 tons. The secondary armament was also quickly reduced to eight six-inch guns. Subsequently there were other alterations. Unfortunately the emergence of the quick-firing gun and the development of high explosive shells coincided with the completion of these ships and quickly rendered them almost ineffective as battleships. They were afterwards regarded as huge protected cruisers.

With her four funnels and generous freeboard the *Lepanto* was a striking ship. She saw no action during her life. This photograph, taken in 1902, shows the extensive awnings used in the Mediterranean.

The arrangement of funnels in pairs to suit the boiler-rooms placed at each end of the central ammunition hoist and barbettes, the mast position and the flying bridges resulted in a symmetrical appearance. The large number of side ports for light and air was unusual.

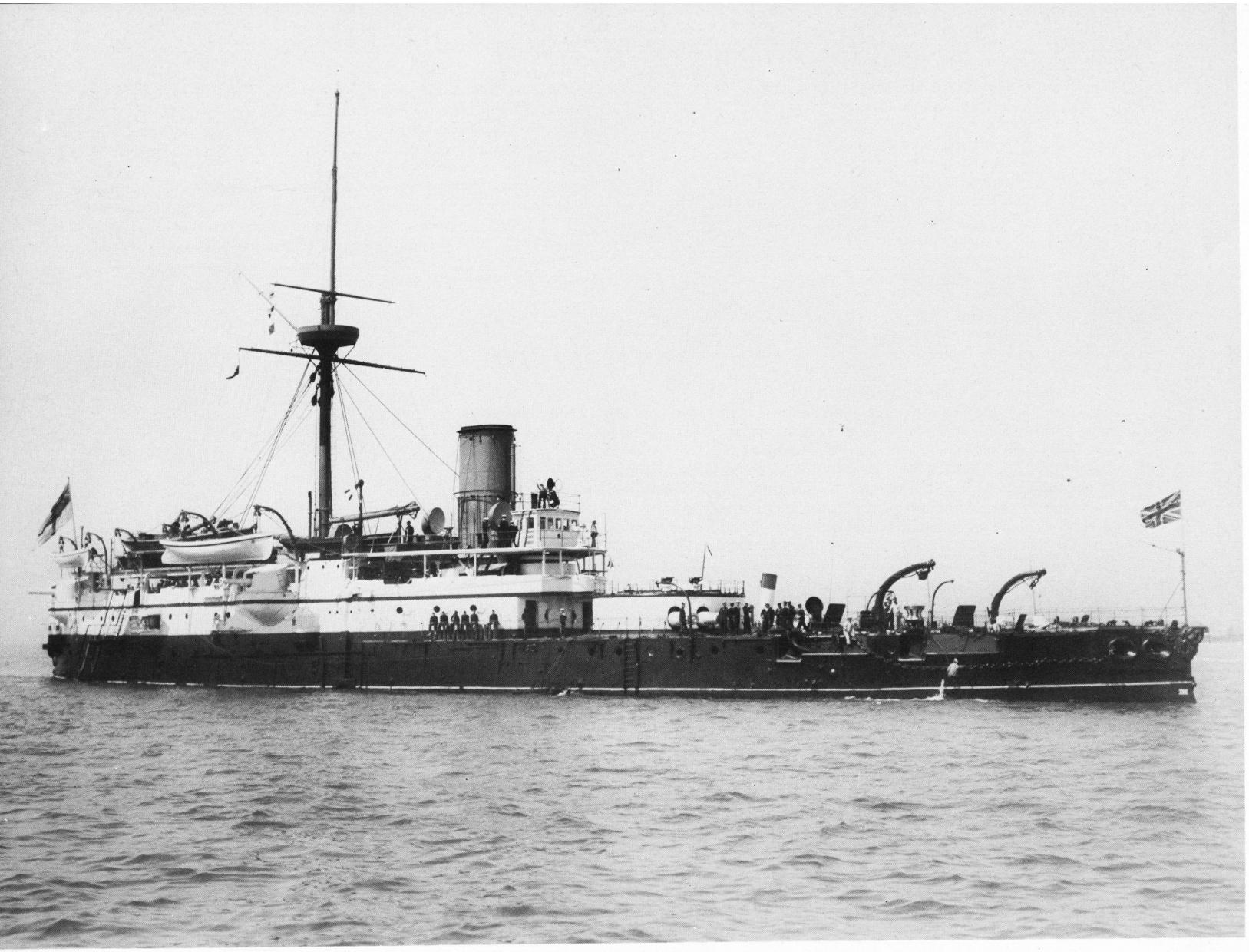
As late as 1906 the *Lepanto* and *Italia* were considered worth renovating but were almost ineffective. In 1913 the *Lepanto* was a gunnery schoolship and in July 1914 she was sold to be broken up.

The *Italia* differed in several ways from the *Lepanto* and had six funnels when built. She was laid up in June 1914 and was removed from the navy list. However, in April 1914 she was towed to Brindisi to serve as a floating battery for harbour defence. In December 1917 she was taken to La Spezia for conversion to a merchant ship for grain carrying, and was finally discarded in November 1921.

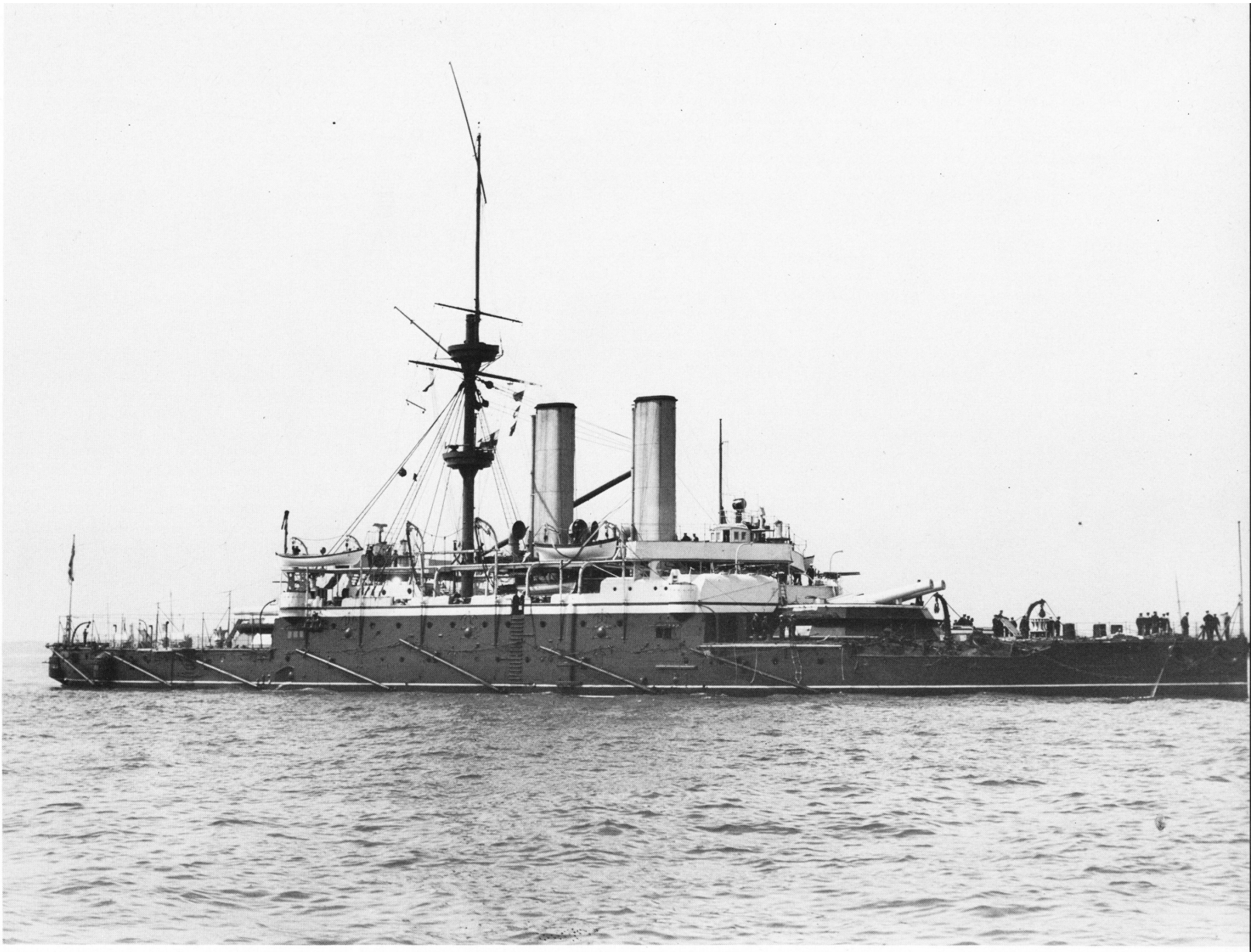
Hero

BRITISH 1888 *Plate 9*

Built	Royal Naval dockyard, Chatham
Laid down	April 1884
Undocked	November 1885
Completed	May 1888
Dimensions	*Length between perpendiculars* 270ft
	Breadth 58ft
	Draught 25ft 9½in
Displacement	6,440 tons
Machinery	Twin screw
	Two 3-cylinder inverted compound engines by Rennie
	Eight cylindrical boilers
	IHP 4,500
	Speed 14 knots
Bunkers	Coal. 500 tons normal. 620 tons maximum
Armament	Two 12-inch 45-ton breech-loading rifled 25 calibre. In turret forward
	Four 6-inch 89-cwt breech-loading rifled. Behind gun shields on sponsons on boat-deck
	Seven 6-pounder quick-firers
	Thirteen smaller guns
	Six 14-inch torpedo tubes above water
Armour	*Belt* 12-inch – 8-inch
	Citadel 12-inch – 10½-inch
	Turret 14-inch – 12-inch
	Conning tower 12-inch – 6-inch
	Decks 2½-inch – 1¼-inch
	Bulkheads 11½-inch – 11-inch – 10½-inch
Complement	330



32 *9 HERO, BRITISH 1888*



33 *10 COLLINGWOOD, BRITISH 1887*

The *Hero* and her sister ship *Conqueror*, completed in 1886, were designed as improvements on the ram ship *Rupert*, but were more heavily armed and not principally intended as rams. The two ships differed only in that the secondary armament of the *Hero* was mounted at boat-deck height, while two of the *Conqueror*'s 6-inch guns were carried on the main deck, inside the superstructure, which in both ships occupied the whole after part above that deck – a feature reproduced in several classes of subsequent British battleships.

The *Hero* and *Conqueror* were regarded as coast defence battleships, and the low freeboard, coupled with the weight and windage of the superstructure, limited their seaworthiness. At sea in bad weather the *Conqueror* once lost a cutter carried at boat-deck level, which was washed out of the chocks by her heavy rolling. Most of their careers were spent as harbour service gunnery tenders; the *Hero* at Portsmouth and the *Conqueror* at Devonport. After about ten years' service they were considered of little value, though the *Hero* had cost £388,746 to build.

During November 1907 the *Hero* was made a target ship and was sunk during gunnery practice off the Kentish Knock in February 1908.

The *Conqueror* was paid off during July 1902, was sent to Rothesay in 1905, and was sold during 1907 for £16,800 to be broken up.

The photograph shows the *Hero* commissioned for naval manoeuvres for a month during 1891. These ships were seldom away from dockyard waters, the *Hero* participating in manoeuvres only during 1888,'89,'90 and'91.

Collingwood

BRITISH 1887 *Plate 10*

Built	Royal Naval dockyard, Pembroke
Laid down	July 1880
Launched	November 1882
Completed	July 1887
Dimensions	*Length* 325ft
	Breadth 68ft
	Draught 26ft 10in mean
Displacement	9,500 tons
Machinery	Twin screw
	Two 3-cylinder inverted compound engines by Humphrys, Tennant and Co
	Twelve oval type boilers
	IHP natural draught = 7,000 = 15 knots
	IHP force draught = 9,500 = 16.5 knots
Bunkers	Coal. 900 tons normal. 1,200 tons maximum
Endurance	6,000 miles and 8,500 miles at 10 knots
Armament	Four 12-inch 45-ton breech-loading. Two forward and two aft
	Six 6-inch quick-firers
	Twelve 6-pounder quick-firers
	Eight 3-pounder quick-firers
	Six machine-guns
Armour	*Belt* 18-inch to 8-inch. 150ft long by 7ft 6in wide
	Bulkheads at ends of belt. 16-inch to 6-inch
	Barbettes 14-inch to 12-inch
	Hoists to barbettes 12-inch
	Deck 2½-inch
	Conning tower 14-inch
Complement	460

The *Collingwood* was an individually designed battleship, forerunner of the "Admiral" class which comprised the *Howe, Rodney, Camperdown* and *Anson,* and followed by the similar individual ship *Benbow.*

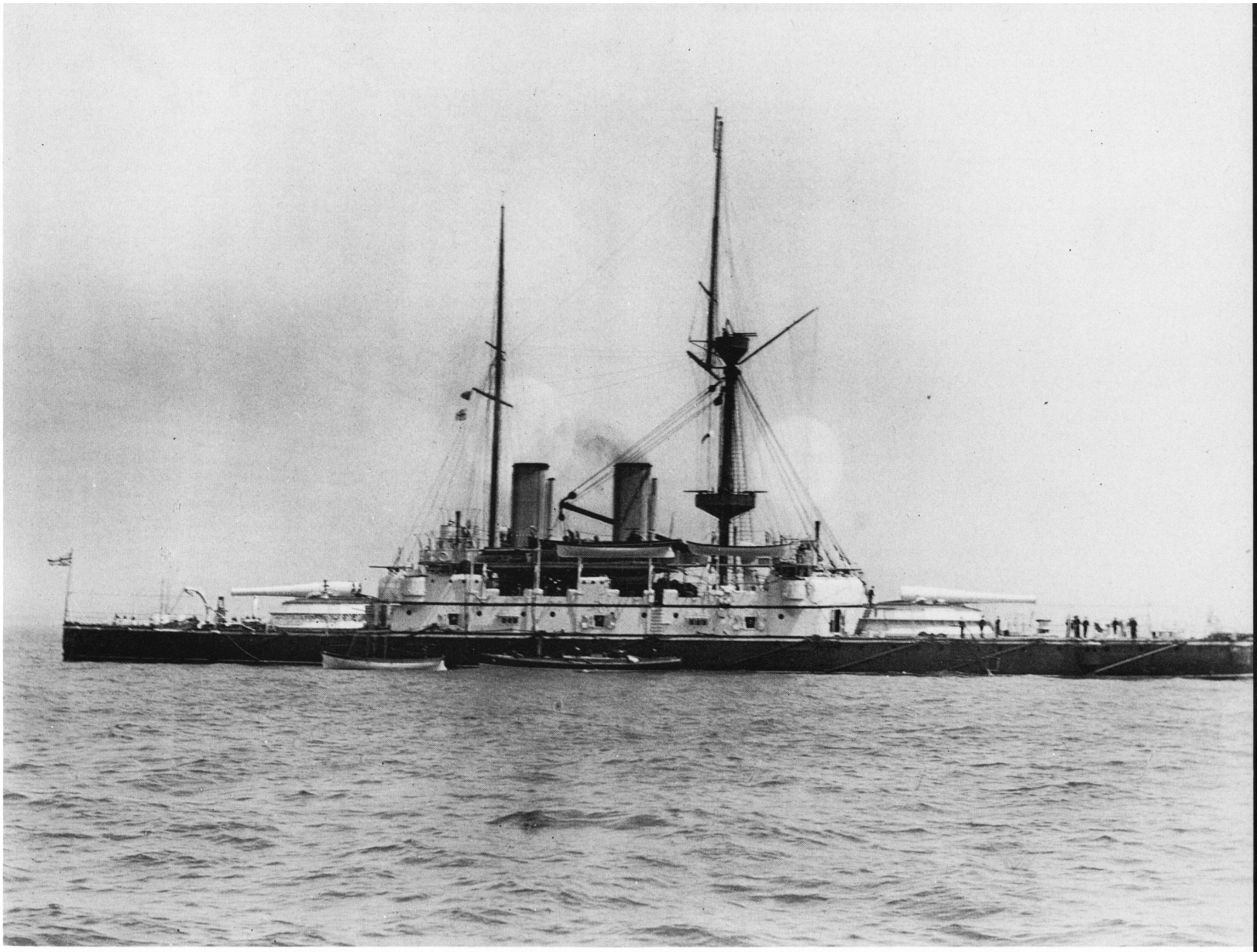
Essentially they were of one type, developed from the *Devastation,* but with heavier guns. They differed only in armament and detail, and were often regarded as a reply to the Italian *Italia* and *Lepanto.* All were constructed of steel and were armoured for slightly less than half their length, with the forward and after parts being protected by an armoured deck. The large guns were mounted in armoured barbettes, without protective hoods, one forward and one aft of a superstructure mounting the secondary guns which varied from six to ten 6-inch quick-firers, besides smaller weapons.

This type of low freeboard battleship was criticised for having a comparatively short and narrow armour belt, leaving more than half the length at the ends unprotected. With the end compartments holed in action, a slight heel with such low freeboard would completely submerge the side armour. There was also the possibility of capsize in those conditions.

Despite their faults, these ships did provide the British fleet with a squadron of battleships of one type, with similar tactical characteristics.

The *Collingwood* arrived at Portsmouth in July 1887 to participate in Queen Victoria's Jubilee review but paid off into reserve during August. She recommissioned for manoeuvres during July-September 1888 but returned to reserve until the 1889 manoeuvres, after which she was prepared for the Mediterranean, arriving there in November 1889 and returning to England during March 1897, having been refitted at Malta in 1896. She became coastguard ship at Bantry, Ireland, from March 1897 until June 1903 and was then placed in "B" reserve at Devonport. In July 1905 the *Collingwood* was transferred to the East Kyle, on the Clyde, remaining there until sold in March 1909 for £19,000 to be broken up.

This photograph was taken in 1902 and clearly shows the angular barbettes for her main armament.



35 *11 HOWE, BRITISH 1889*

Howe

BRITISH 1889 *Plate 11*

Built	Royal Naval dockyard, Pembroke
Laid down	June 1882
Launched	April 1885
Completed	July 1889
Dimensions	*Length* 325ft
	Breadth 68ft
	Draught 27ft 3in mean
Displacement	10,300 tons
Machinery	Twin screw
	Two 3-cylinder, inverted compound engines by Humphrys, Tennant and Co
	Twelve oval type boilers
	IHP natural draught = 7,500 = 15.5 knots
	IHP forced draught = 11,500 = 16.7 knots
Bunkers	Coal. 900 tons normal. 1,200 tons maximum
Endurance	5,000 and 7,200 miles at 10 knots
Armament	Four 13.5 67-ton breech-loading guns. Two forward and two aft
	Six 6-inch quick-firers
	Twelve 6-pounder quick-firers
	Ten 3-pounder quick-firers
	Seven machine-guns
Armour	*Belt* 18-inch – 8-inch. 150ft long by 7ft 6in wide
	Bulkheads at ends of belt 16-inch – 6-inch
	Barbettes 11½-inch – 10-inch
	Hoists to barbettes 12-inch
	Deck 3-inch – 2½-inch
	Conning tower 14-inch
Complement	510

Very similar to the earlier *Collingwood*, the *Howe*, with her sister ship *Rodney*, the *Camperdown* and *Anson*, was one of the "Admiral" class battleships. These ships were very completely divided, having ninety-eight watertight doors in the hull.

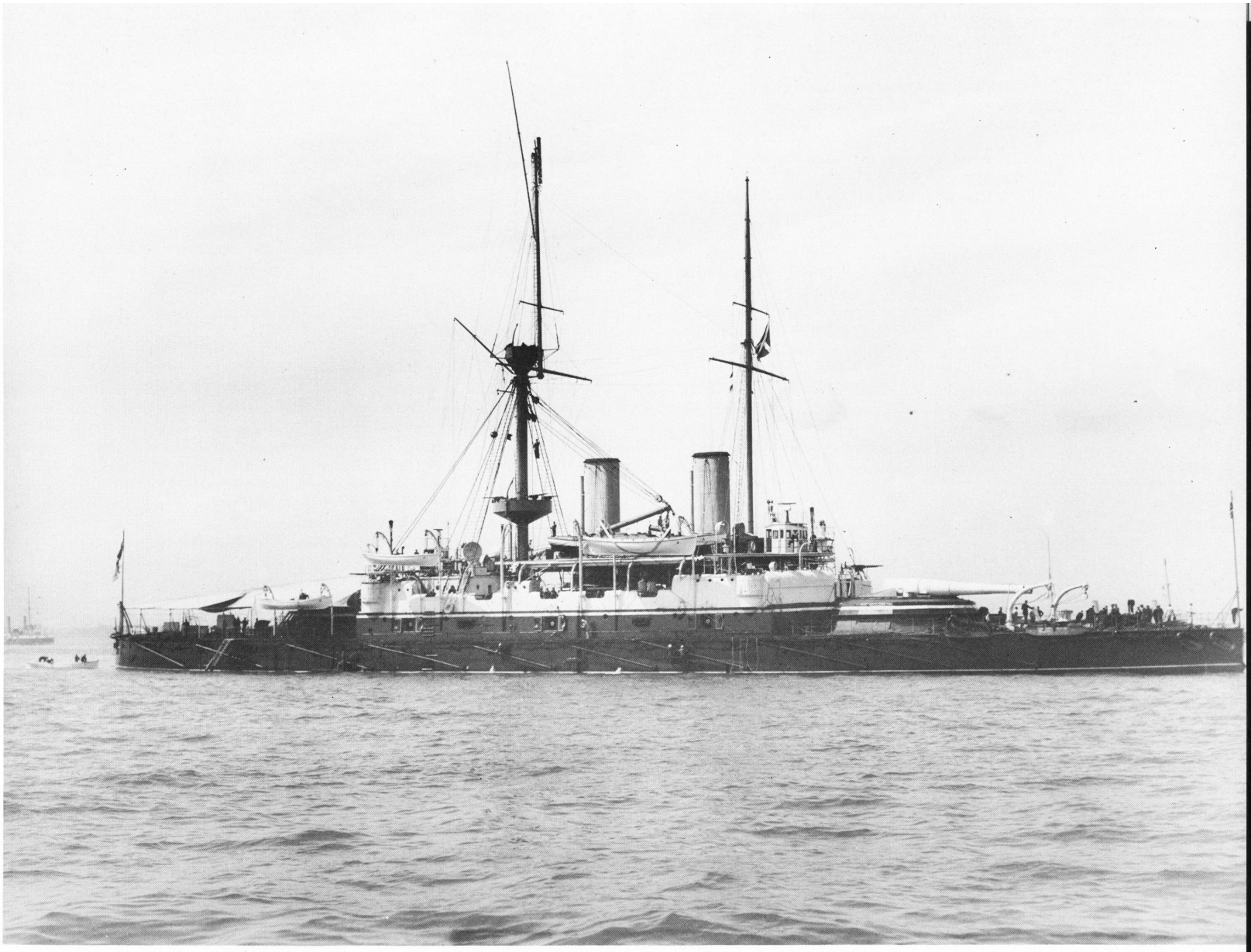
The *Howe* was delivered to Portsmouth during November 1885 to have her guns fitted, being first commissioned in July 1889 for fleet manoeuvres. In May 1890 she replaced the battleship *Iron Duke* in the Channel fleet, and during the fleet's Mediterranean cruise in November 1892, she stranded on a rock off Ferrol, Spain – a great blow to British pride. Salvage was difficult and was eventually successfully undertaken by a Swedish company, who refloated her in March 1893. Temporary repairs were made at Ferrol during April, after which she returned to Chatham for complete refitting, which cost £45,000. During October 1893 the *Howe* relieved the *Edinburgh* in the Mediterranean fleet. She returned to England in December 1896 and was ordered to Queenstown, Ireland, as portguard ship, serving there except when absent on manoeuvres. In October 1901 she was transferred to reserve at Devonport. She recommissioned during the July-September manoeuvres of 1904 for her last seagoing service and returned to reserve until sold in October 1910 for £25,100 to be scrapped.

The photograph, taken in 1897, shows one of her steam torpedo-carrying launches alongside. Usually two of these were carried on board British battleships of the time, and were fitted with dropping gear for 14-inch diameter torpedoes. They served as picket boats when not on exercises.

Anson

BRITISH 1889 *Plate 12*

Built	Royal Naval dockyard, Pembroke
Laid down	April 1883
Launched	February 1886
Completed	May 1889
Dimensions	*Length* 330ft
	Breadth 68ft 6in
	Draught 26ft 9in mean. 28ft 5in maximum
Displacement	10,600 tons
Machinery	Twin screw
	Two 3-cylinder inverted compound engines by Humphrys, Tennant and Co
	Twelve cylindrical boilers
	IHP natural draught = 7,500 = 15.7 knots
	IHP forced draught = 11,500 = 17.4 knots
Bunkers	Coal. 900 tons normal. 1,200 tons maximum
Endurance	5,000 miles and 7,100 miles at 10 knots
Armament	Four 13.5-inch 67-ton breech-loading guns. Two forward to aft, in barbettes
	Six 6-inch breech-loading quick-firers. 26 calibre
	Twelve 6-pounder quick-firers
	Ten 3-pounders
	Seven machine-guns
	Five torpedo tubes above water
Armour	*Belt* 18-inch amidships – 8-inch at ends. 150ft long by 7ft 6in wide
	Bulkheads at ends of belt 16-inch – 6-inch
	Barbettes 14-inch – 12-inch
	Hoists to barbettes 12-inch



12 ANSON, BRITISH 1889

Deck 3-inch – 2½-inch
Conning tower 12-inch
Complement 525 – 536

The *Anson* and her sister ship *Camperdown* were two more of the "Admiral" class battleships.

The *Anson* was delivered to Portsmouth dockyard from Pembroke during March 1887, complete except for the main armament. She was not ready for sea until May 1889, when she commissioned as rear-admiral's flagship, Channel fleet. In September 1893 she joined the Mediterranean fleet and was refitted at Malta during 1896. She returned to England in July 1900 to pay off at Devonport into "C" reserve, but in February 1901 the *Anson* was transferred to the "A" reserve. Her torpedo tubes were removed about this time and maximum speed had fallen to about 13.5 knots. As a third class battleship she was almost obsolete but during March 1901 was commissioned to join the newly formed Home fleet and served until May 1904, when she was relegated to "B" reserve at Chatham, remaining there until sold in July 1909 for £21,200 to be scrapped.

Taken about 1902, in the last years of the smart Victorian colouring, this photograph shows the vulnerability of barbette-mounted guns.

Camperdown

BRITISH 1889 *Plate 13*

Built Royal Naval dockyard, Portsmouth
Laid down December 1882
Launched November 1885
Completed July 1889
Dimensions *Length* 330ft
Breadth 68ft 6in
Draught 26ft 9in normal. 28ft 5in deep-loaded
Displacement 10,600 tons
Machinery Twin screw
Two 3-cylinder inverted compound engines by Maudslay, Son and Field
Twelve cylindrical boilers
IHP natural draught = 7,500 = 15.5 knots
IHP forced draught = 11,500 = 17.2 knots
Bunkers Coal. 900 tons normal. 1,200 tons maximum
Endurance 5,000 miles and 7,100 miles at 10 knots
Armament Four 13.5-inch 67-ton breech-loading guns.
Two forward and two aft, in barbettes
Six 6-inch breech-loading quick-firers. 26 calibre
Twelve 6-pounder quick-firers
Ten 3-pounder quick-firers
Seven machine-guns
Five torpedo tubes above water
Armour Compound
Belt 18-inch – 8-inch
Bulkheads 16-inch – 7-inch
Barbettes 14-inch – 12-inch
Screens to battery 6-inch
Upper deck amidships 3-inch
Lower deck 2½-inch
Conning tower 12-inch – 2-inch
Complement 515

Sister ship of the *Anson (Plate 12)*, the *Camperdown* was another of the six "Admiral" class battleships. She cost £677,724 to build and first commissioned at Portsmouth in July 1889 for the Home fleet manoeuvres, but during September went into reserve. In December 1889 she sailed to become flagship of the Mediterranean fleet and in May 1890 transferred to the Channel fleet as flagship, replacing the ironclad *Northumberland*. In May 1892 the *Camperdown* went into fleet reserve "A" but was commissioned for manoeuvres in July and subsequently returned to the Mediterranean fleet.

On 22nd June 1893 the Mediterranean fleet was steaming between Beirut and Tripoli, off the Syrian coast, in fine weather, manoeuvring before anchoring off Tripoli. Admiral Sir George Tryon, leading the starboard division in the flagship *Victoria*, ordered his two columns of ships to turn 16 points (a half circle) inwards towards each other, when steaming only 6 cables apart. He had previously decided on carrying the manoeuvre out at 8 cables, a safe distance, as the turning circle of these ships was about 800 yards. 10 cables (2,000 yards) would have been prudent to bring the ships to the usual distance apart for anchoring.

Tryon frequently ordered complicated manoeuvres which were not explained beforehand, though fully discussed afterwards. All executive officers in the fleet knew that the 6 cables order made collision almost certain and Rear-Admiral Hastings Markham, leading the port column in the *Camperdown*, ordered a semaphored query to be made to the flagship, keeping his answering signal at the dip. Before this was sent, the *Victoria* signalled to know why he was hesitating. Markham had the signal acknowledged, concluding he had misunderstood the purpose of the order. He had confidence in Tryon though, like many others in the fleet, he was extremely unhappy about this manoeuvre.

The *Victoria* and the *Camperdown*, the leading ships, turned inwards at 3.31 pm and it quickly became obvious that disaster was imminent. As they closed, the port engine of the *Victoria* was put astern and when two-thirds of the turn was completed and collision was seen to be

39 *13 CAMPERDOWN, BRITISH 1889*

inevitable, both engines were at full astern. The *Victoria* had a slightly smaller turning circle than the *Camperdown*, which struck her starboard side, forward, at an acute angle, both ships moving at about 6 knots. The *Camperdown*'s ram proved its effectiveness and tore a hole in the *Victoria*'s hull, swinging round to enlarge it and rupture two vital watertight bulkheads abaft it. The order to close watertight doors and hatches was not given until one minute before impact, and usually three minutes were needed to achieve this, so many compartments were flooded.

The *Victoria* listed to starboard and with her bow well under water was steamed slowly towards shallow water, hoping to beach, but her deck was immersed to the superstructure, where doors and other openings were not closed. A lurch brought an inrush of water into the battery and through open hatches into the hull which heeled slowly until the port propeller emerged and she capsized and sank by the bow, drowning Tryon and three hundred and twenty-one officers and men in the greatest peacetime disaster the Royal Navy had suffered for generations.

The cause of the confusion of orders has never been satisfactorily explained but it is thought to have been an error of judgement by Admiral Tryon. The fleet was accustomed to making quarter turns, whereas half turns were seldom executed and required more space between ships, so it is probable that Tryon ordered the manoeuvre in good faith but erred in the distance calculation for the half turn. Although many officers realised the error in the order, discipline and faith in the Admiral were such that it was obeyed.

The *Camperdown* was refitted from July to September 1893 and underwent a major refit during 1896-7, when a signal mast was stepped and the charthouse was altered. This photograph was taken in 1897 and shows the breeches of the forward guns. She paid off at Portsmouth in September 1899 and went into "B" reserve. The following May she transferred to the "C" reserve but commissioned in July 1900 as coast-guard ship at Lough Swilly, Ireland. In May 1903 she reverted to "B" reserve at Chatham and was prepared to be a submarine depot ship to be stationed at Harwich, where she served from October 1908 until sold in July 1911 for £28,000 to be broken up.

Benbow

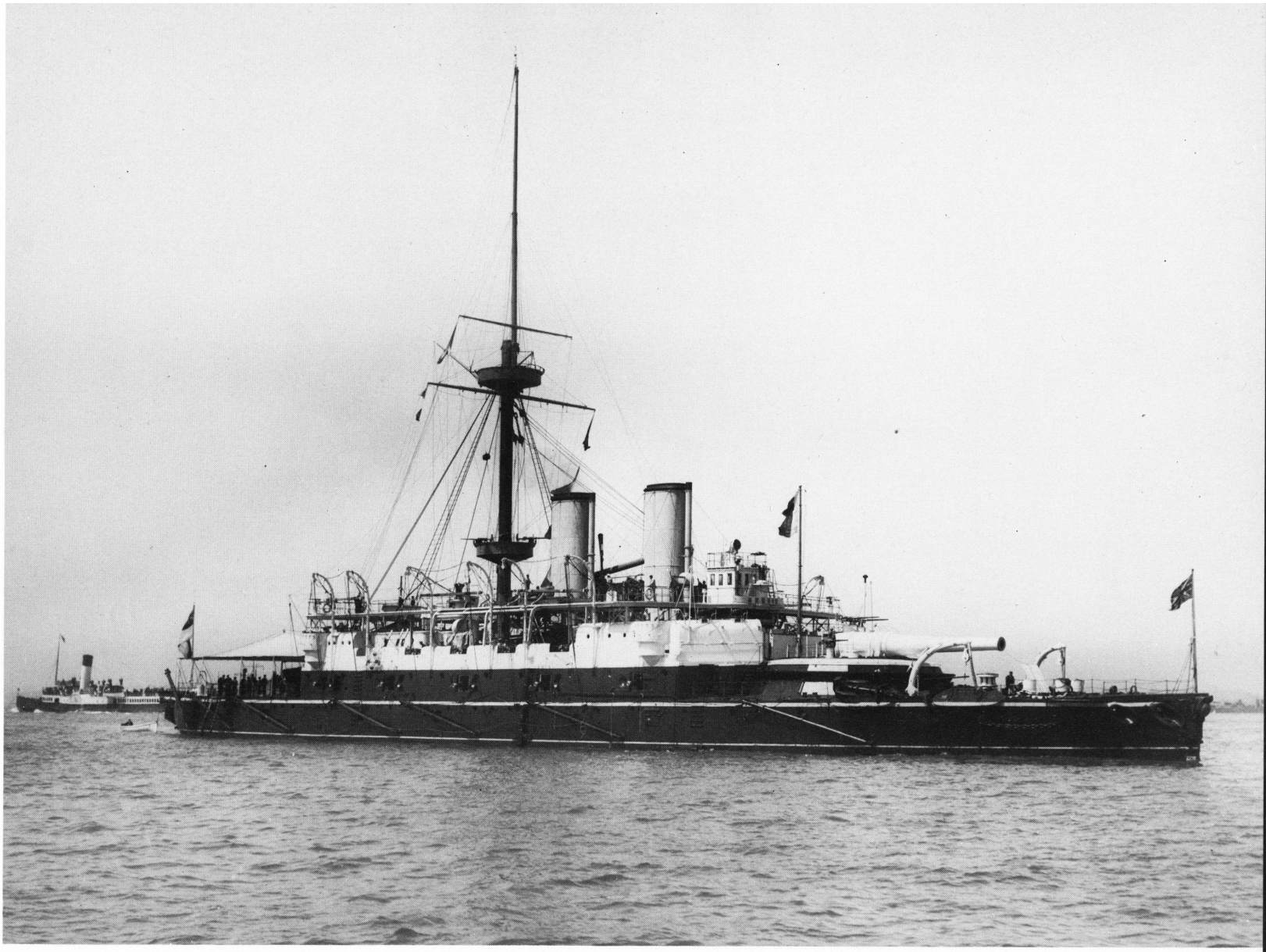
BRITISH 1888 *Plate 14*

Built	Thames Ironworks, Blackwall, London
Laid down	November 1882
Launched	June 1885
Completed	June 1888
Dimension	*Length* 330ft
	Breadth 68ft 6in
	Draught 27ft 5in. 28ft 5in deep-loaded
Displacement	10,600 tons
Machinery	Twin screw
	Two 3-cylinder inverted compound engines by Maudslay, Son and Field
	Twelve cylindrical boilers
	IHP natural draught = 7,500 = 15.7 knots
	IHP forced draught = 10,860 = 17.5 knots
Bunkers	Coal. 900 tons normal. 1,200 tons minimum
Endurance	5,000 and 7,100 miles at 10 knots
Armament	Two 16.25-inch 110-ton breech-loading Armstrong guns. One forward one aft in barbettes
	Ten 6-inch quick-firers
	Twelve 6-pounder quick-firers
	Ten 3-pounder quick-firers
	Seven machine-guns
	Five torpedo tubes. One bow. Four broadside
Armour	Compound
	Belt 18-inch – 8-inch. 150ft by 7ft 6in
	Bulkheads 16-inch – 6-inch
	Barbettes 14-inch – 12-inch
	Screens to battery 6-inch
	Upper deck amidships 3-inch
	Upper deck at ends 2½-inch
	Conning tower 12-inch – 2-inch
Complement	525

The *Benbow* was ordered with the later "Admiral" class battleships, but due to pressure of work in the Royal dockyards, was placed with the Thames Ironworks at Blackwall, delivery being stipulated within three years. As Woolwich Arsenal could not construct the necessary number of 13.5-inch guns in time for her completion, the alternative was to use either 12-inch, as in the *Collingwood*, or the Elswick 105-ton, 17-inch, breech-loading monsters which the firm had been supplying for the new Italian battleships of the "Andrea Doria" class.

Weight and structural considerations allowed only one 16.25-inch gun to be mounted in each of the *Benbow's* two barbettes. However, ten 6-inch guns could be carried in the battery instead of the six 6-inch of the other ships. The *Benbow* was always regarded with awe because of her huge guns, but they were slow in action, only managing one round every five minutes, and had a much shorter life than the 13.5-inch pieces.

The *Benbow* cost £764,022 to build and was delivered to Chatham during August 1886. She did not commission until June 1888, for the Mediterranean fleet, serving there until October 1891, when she paid off into reserve at Chatham, having proved a good steamer and a reasonably good sea boat. In June 1892 she commissioned for manoeuvres, and again from July to September 1893, reverting to fleet reserve "B" until



41 *14 BENBOW, BRITISH 1888*

42 *15 BATTLESHIPS AT THE CORONATION NAVAL REVIEW, 1902*

March 1894, when she was sent to Greenock as coastguard ship, stationed there until April 1904 but participating in fleet manoeuvres. During those of 1903 the exercising fleet encountered a gale which shook the fleet out of station, but the old *Benbow* kept up with the flagship *Revenge*, leaving more "seaworthy" ships well astern, and the battleship *Royal Sovereign* hull-down.

The *Benbow* returned to "B" reserve at Devonport until sold in July 1909 for £21,200 to be scrapped. This photograph shows her at the Coronation naval review at Spithead, 1902, and expresses the size of her main guns which dwarfed the light quick-firers mounted on the superstructure and barbette top.

Battleships at the Coronation Naval Review, Spithead, 1902.

Plate 15

Many naval reviews have been held at Spithead, that arm of water between the eastern part of the Isle of Wight and the mainland of southern England, close to Portsmouth harbour with its centuries old naval dockyard. Reviews were held to commemorate important events, occasionally to impress important foreign visitors and particularly to mark coronations, when the new sovereign sails through the fleet to the cheers of its officers and men and the thunder of salutes. The last major review of British and foreign warships was held at Spithead in 1953, to mark the coronation of Queen Elizabeth II.

Many naval reviews were held during the long reign of Queen Victoria, notably the Jubilee reviews of 1887 and 1897. These two great gatherings of British and foreign warships brought striking contrasts: sails and rigging were conspicuous in 1887 but had almost disappeared ten years later.

Queen Victoria died in 1901, and when her son, King Edward VII, was crowned in 1902 another review assembled at Spithead, with many foreign warships attending. Britain not only put on show her newest and finest battleships and cruisers, besides scores of smaller craft, but also swelled the long review lines with older battleships, normally relegated to portguard and coastguard duties around her coasts. Almost obsolete battleships and other major vessels were even sometimes temporarily commissioned from the dockyards to fill the lines and avoid having to withdraw modern ships from the Mediterranean fleet.

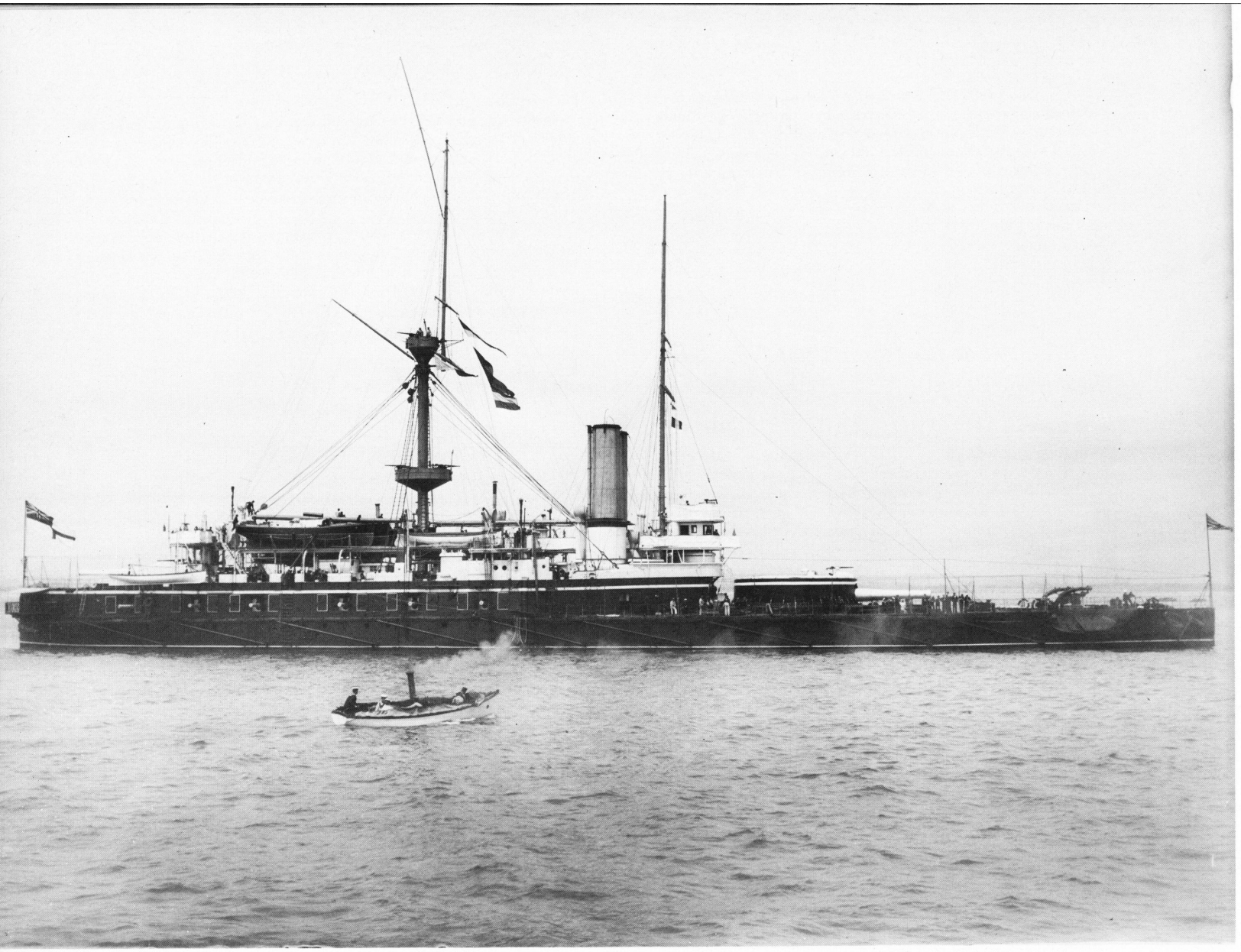
The ageing battleship *Benbow* occupies the foreground of this typical review scene in 1902, with the *Sanspareil* and other similar battleships astern. These low freeboard ships of the 1880's contrast with the healthy freeboard and 15,000-ton bulk of the newly completed battleship *London*, extreme right, flagship of the review and just commissioned at Portsmouth dockyard. The crossed yards on the tall masts were still necessary for the extensive flag and seaphore signalling needed before wireless brought a new dimension to war at sea. The sailing tradition died hard in a navy which had seen no fleet against fleet action for almost a century and patrolled the oceans secure in its overwhelming superiority of numbers, and the *London* carried topmasts, with their associated weight, windage and rigging.

A signal has broken out from the *London*'s yard arm, bringing officers of the watch on the alert and signalmen ready with the acknowledgement. A steam yacht slices through the lines of warships and a cargo-carrying spritsail barge beats up from the eastward. Boats lie to the booms, paintwork glistens, canvas dodgers stretch taut and ships lie at anchor in mathematical precision of review order.

Sanspareil

BRITISH 1889 *Plate 16*

Built	Thames Ironworks, Blackwall, London
Laid down	April 1885
Launched	May 1887
Completed	1889
Dimensions	*Length between perpendiculars* 340ft
	Breadth 70ft
	Draught 27ft 9in mean
Displacement	10,470 tons
Machinery	Twin screw
	Two triple expansion engines by Humphrys, Tennant and Co
	Eight boilers
	IHP natural draught = 7,500 = 15.6 knots
	IHP forced draught = 14,000 = 17.5 knots
	Trials achieved 17.75 knots
Bunkers	Coal. 900 tons normal. 1,200 tons maximum
Endurance	at 10 knots from above = 5,000 miles and 7,000 miles
Armament	Two 16.25-inch 110-ton guns. Pair mounted in turret forward
	One 9.2-inch 29-ton gun. Aft
	Twelve 6-inch quick-firers. In battery amidships
	Twelve 6-pounders
	Twelve 3-pounders
	Eight machine-guns
	Three 14-inch torpedo tubes. Two submerged. Carried twenty-four torpedoes
Armour	Compound
	Belt 18-inch – 16-inch. 152ft long by 8ft 4in wide.



44 *16 SANSPAREIL, BRITISH 1889*

Redoubt 18-inch
Bulkheads 16-inch
Turret 18-inch
Shield to 9.2-inch gun 6-inch
Battery bulkheads 3-inch
Deck 3-inch
Conning tower 14-inch
Complement 630

By the 1880's British battleship design had moved towards the mounting of the largest guns, protected by the heaviest armour it was possbile to produce. This policy reduced the number of large guns to two, which in turn influenced the design of the *Sanspareil* and her sister ship the *Victoria*.

They were the last of a series of battleships of this general type built for the fleet, were the first to have triple-expansion engines instead of the compounds of their predecessors, and had the heaviest armour protection since the *Dreadnought*. The design was intended as an improvement on the *Conqueror* and *Hero (Plate 9)* and the ships were built with use in the Mediterranean in mind; possibly in having to force the 'Dardanelles, then a contingency of British naval policy. Construction took nearly four years due to Elswick having trouble making the 16.25-inch guns. These had a life of only 75 rounds at a very slow rate of fire, proved costly to repair and reline, and were described as "a highly respectable blunder". The ships had in all eight sizes of gun on board, which caused magazine difficulties.

At 6,000 tons launching weight the *Sanspareil* was the heaviest ship launched since the *Great Eastern*. She was completed with distinctive tall funnels abreast, and the *Victoria*'s being similarly raised after completion.

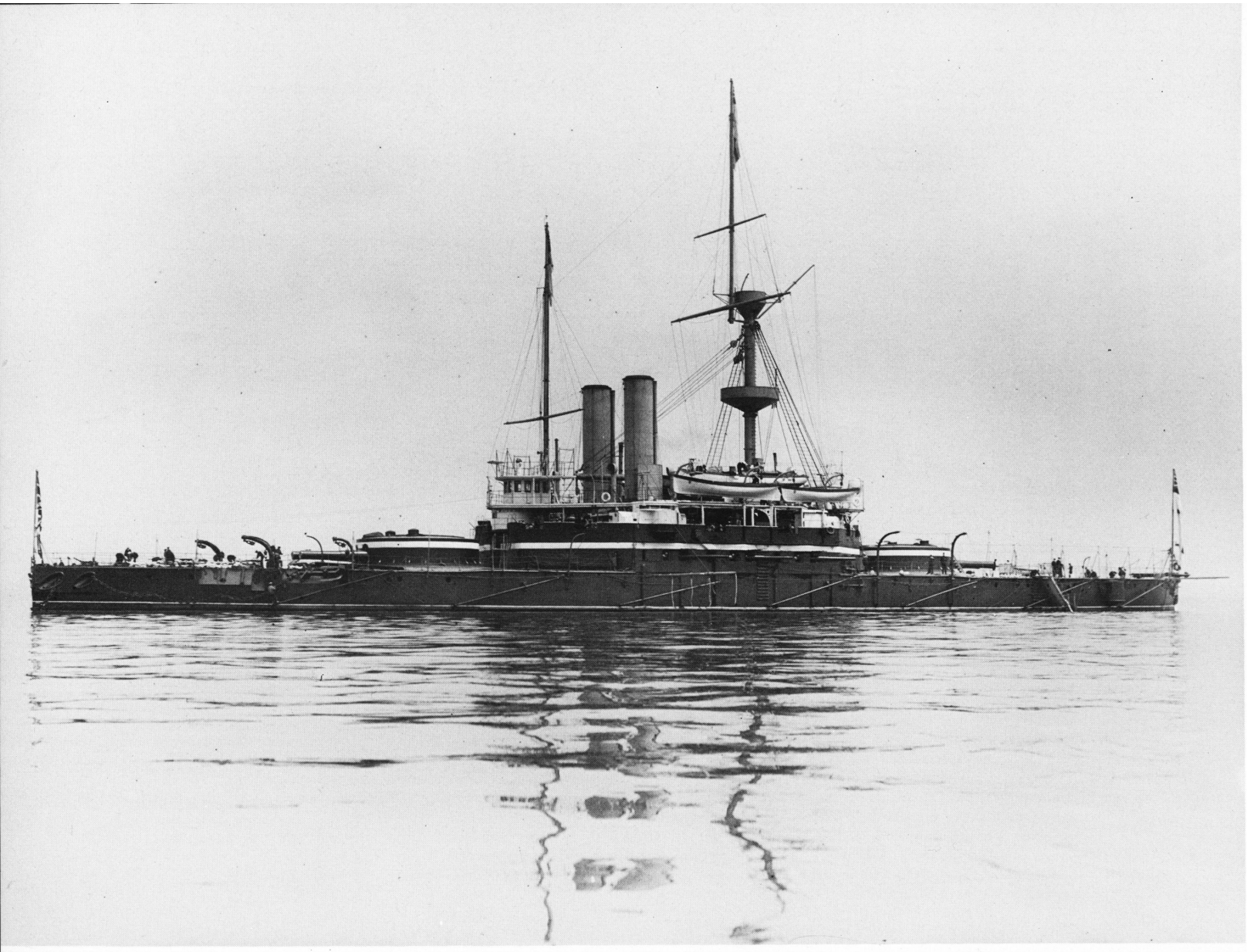
The *Sanspareil* was commissioned at Chatham in July 1891 but was immediately placed in reserve due to scarcity of men. She recommissioned in February 1892 for service with the Mediterranean fleet until April 1895, afterwards becoming port guardship at Sheerness. She became an independent command as guardship in May 1898 and remained in that service until December 1903. During January 1904 she went into reserve, and was sold for scrapping in April 1907 for £26,000. The loss of her sister *Victoria* was one of the most tragic and inexplicable events in British naval history (see under "*Camperdown*", *Plate 13)*. After the *Victoria*'s capsize the sub-division of the *Sanspareil* was improved. She was the best sea boat of the low freeboard battleships of the time.

This photograph, taken in 1898, shows considerable detail and illustrates the confused contemporary thought on gun mounting. The two 16.25-inch guns in the turret forward are not balanced by the single 9.2-inch aft. The battery consisted of six 6-inch quick-firers on each side, protruding through side ports which gave an almost "wooden wall" appearance to a steel and steam warship. The number of boats carried by a battleship can also be seen, from 52ft steam pinnaces to the slender gig of beautiful hull form slung on the starboard quarter. A small steam launch with dodgers rigged is returning to the parent ship.

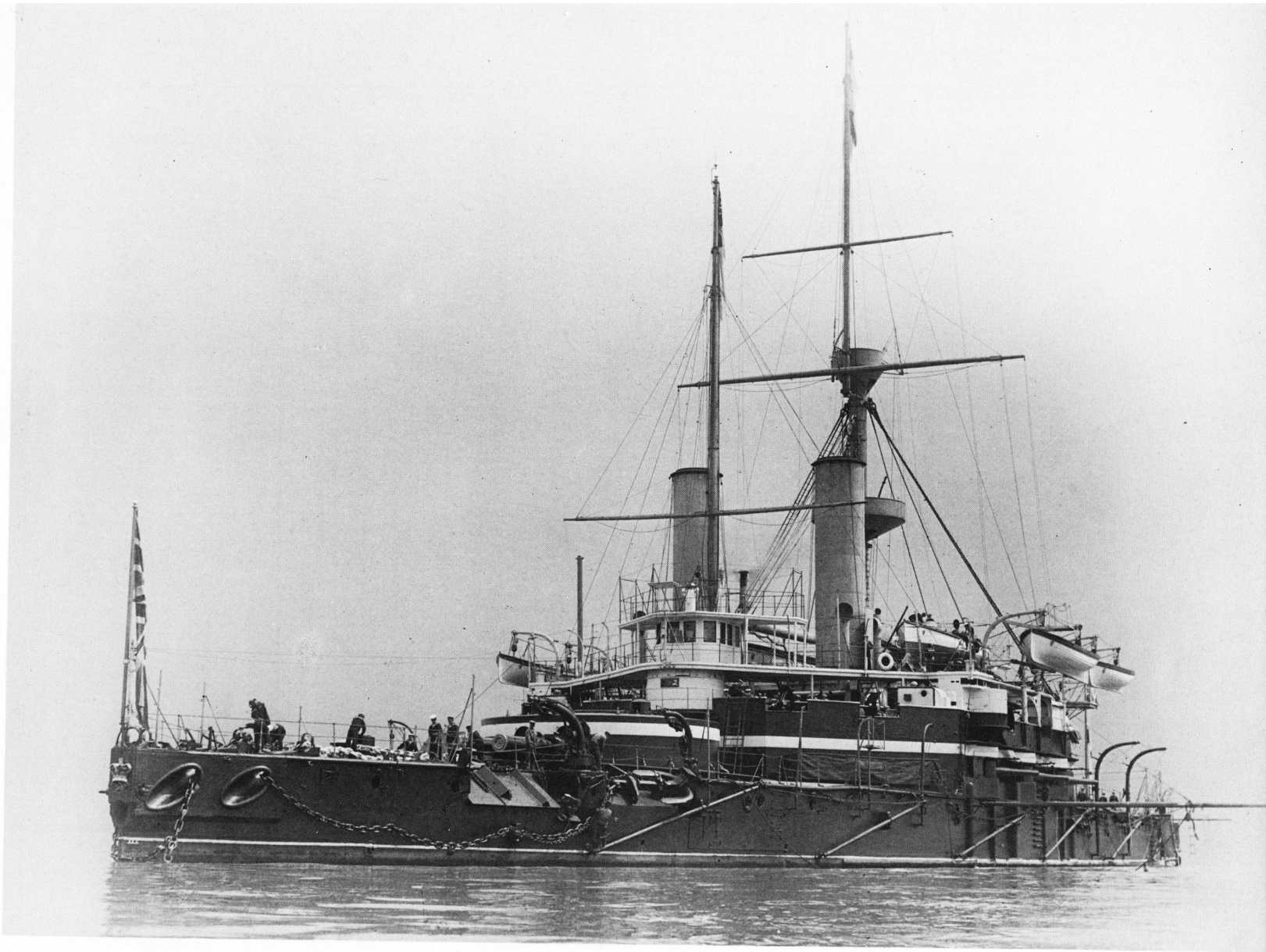
Trafalgar

BRITISH 1890 *Plates 17 and 18*

Built Royal Naval dockyard, Portsmouth
Laid down January 1886
Launched September 1887
Completed March 1890
Dimensions *Length* 345ft
Breadth 73ft
Draught 27ft 6in mean. 29ft maximum
Displacement 12,590 tons. At 28ft draught
Machinery Twin screw
Two vertical triple expansion engines by Humphrys and Tennant
Six cylindrical boilers
IHP natural draught = 7,500 = 15.1 knots
IHP forced draught = 12,000 = 16.75 knots (17.2 knots trials)
Bunkers Coal. 900 tons normal. 1,200 tons maximum
Endurance 1,050 miles at 16.25 knots. 6,500 miles at 10 knots
Armament *Original*
Four 13.5-inch 67-ton breech-loading guns. Two forward and two aft in turrets.
Six 4.7-inch quick-firers
Eight 6-pounder quick-firers
Twelve 3-pounder quick-firers
Torpedo tubes added 1890. 14-inch diameter. One bow. One, stern. Two sides
Alterations 1896
Six 6-inch quick-firing guns replaced 4.7-inch secondary armament
Armour Compound
Belt 20-inch amidships to 14-inch at ends. 8-inch – 6-inch at lower edge. 230ft long by 8ft 6in wide
Bulkheads 16-inch forward and 14-inch aft
Citadel 18-inch – 16-inch
Turrets 18-inch
Battery bulkheads 5-inch
Battery sides 4-inch
Deck 3-inch
Conning tower 3-inch
Complement 520



46 *17 TRAFALGAR, BRITISH 1890*



47 *18 TRAFALGAR, BRITISH 1890*

In many respects the design of the *Trafalgar* and her sister ship *Nile* reverted to the best features of the "Devastation" type battleships of the 1870's, which were highly regarded by those serving in them.

The *Trafalgar* and *Nile* had improved protection compared to their immediate predecessors and a consequently greater displacement, almost one third of which was due to weight of armour.

When these ships were projected in 1885, fear of the dominance of naval warfare by the torpedo and torpedo boat led to predictions that they would be the last battleships to be built, but by the time they were ready for sea the torpedo had been brought into perspective and battleships were to survive for a further sixty years.

The 13.5-inch guns mounted in two turrets, forward and aft, foreshadowed the long line of subsequent British "pre-Dreadnought" battleships. Four single rounds could be fired in eight minutes.

The *Trafalgar* was completed with short funnels like the *Victoria*, but these were heightened 17ft in 1891, to obtain better draught.

The *Trafalgar* cost £859,070 ready for sea but was completed before her guns were ready and did not commission until April 1890, as second flagship of the Mediterranean fleet. She served there for seven years and received a new secondary armament of 6-inch guns during a refit in 1896. She returned to England and paid off at Portsmouth in October 1897, remaining there as portguard ship until August 1902, when she was relegated to fleet reserve "A", and during September 1903 to dockyard reserve.

In April 1905 the *Trafalgar* was transferred to the reserve fleet at Devonport and in March 1907 moved to Sheerness to become turret drill-ship until April 1909 when she joined the 4th division, Home fleet at the Nore. In March 1911 she was sold for £29,000 to be scrapped.

Plate 17 gives a general view of the *Trafalgar* in 1898 and *Plate 18* shows considerable detail and emphasises her low freeboard and the size of the turrets. The widely spaced funnels and spacious bridge indicate her beam.

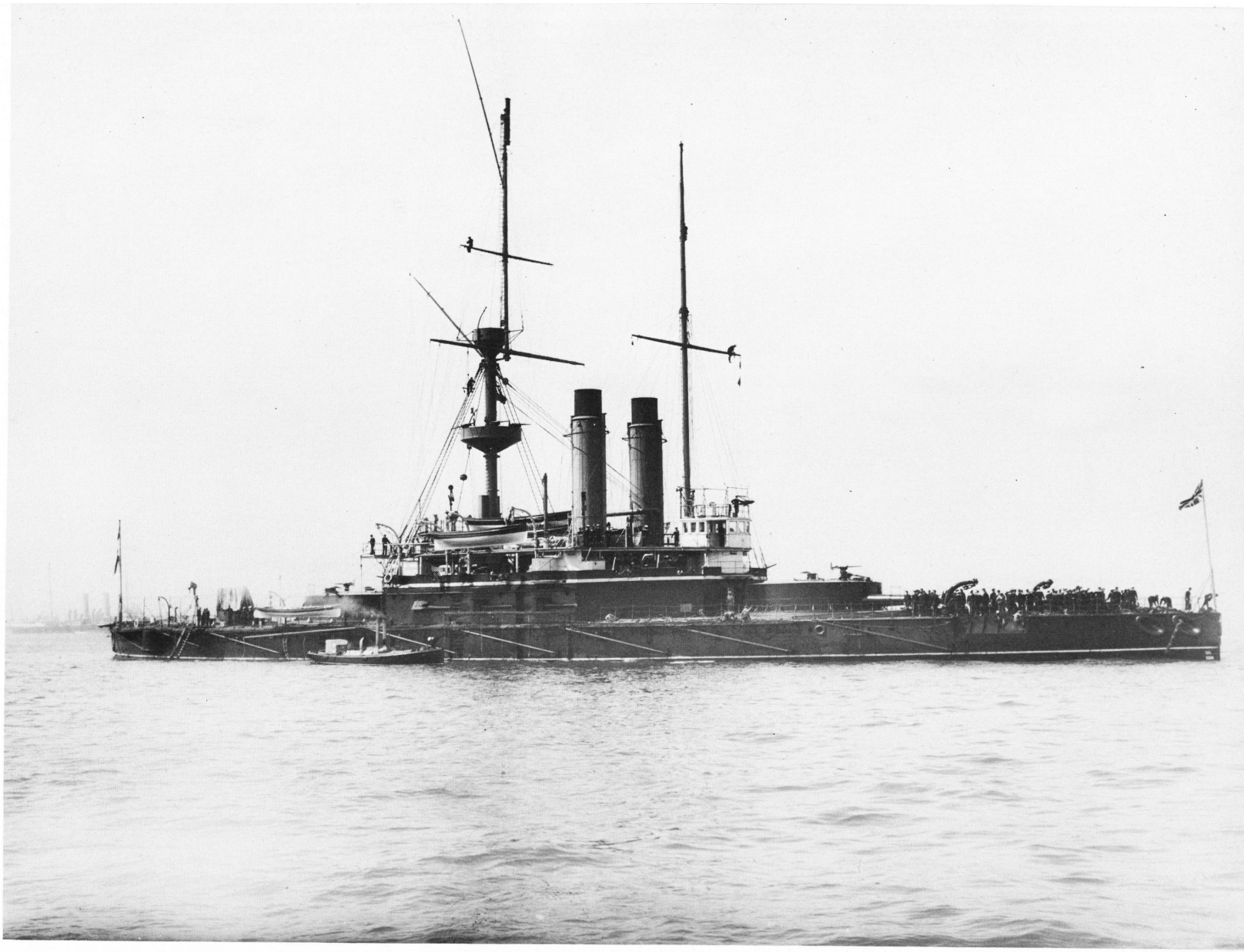
The anchoring arrangements of contemporary British battleships were elaborate, the hawse pipes being comparatively short and the anchors stowed on recessed billboards with heavy catting davits. The chain cables led aft from the hawse and were an embarrasment at sea in bad weather. Although bowsprits and figureheads had long disappeared from warships, the custom of carrying a bow decoration persisted to the end of the nineteenth century in the British Navy, and the *Trafalgar*'s crown is clearly visible on the face of the stem.

Nile

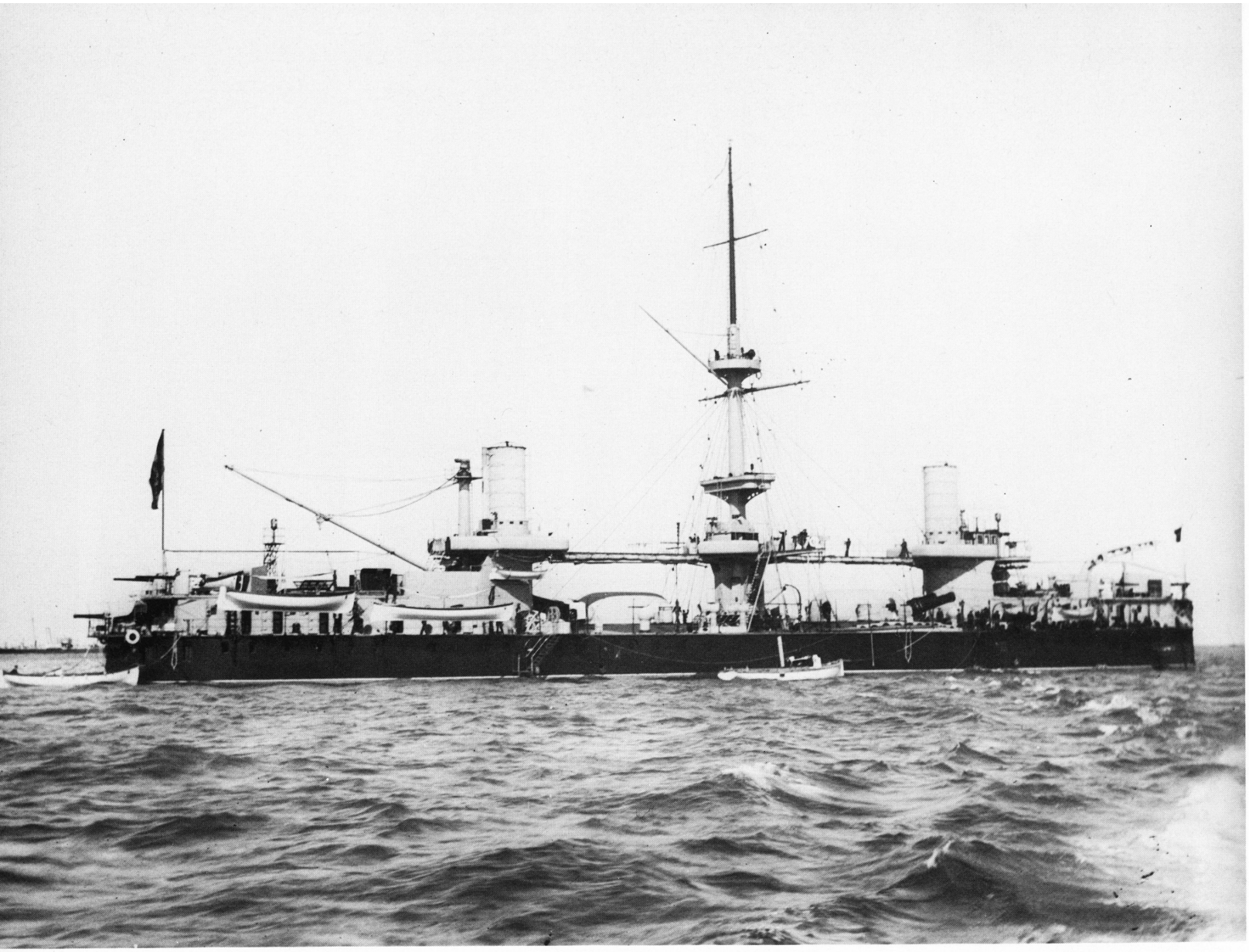
BRITISH 1891 *Plate 19*

Built	Royal Naval dockyard, Pembroke
Laid down	April 1886
Launched	March 1888
Completed	July 1891
Dimensions	*Length* 345ft
	Breadth 73ft
	Draught 27ft 6in mean. 29ft maximum
Displacement	12,590 tons. At 28ft draught
Machinery	Twin screw
	Two vertical triple expansion engines by Maudslay, Son and Field
	Six cylindrical boilers
	IHP natural draught = 10,112 = about 16 knots trials
	IHP forced draught = 12,102 = 16.8 knots trials
Bunkers	Coal. 900 tons normal. 1,200 tons maximum
Endurance	1,050 miles at 16.25 knots. 6,500 miles at 10 knots
Armament	*Original*
	Four 13.5-inch 67-ton breech-loading guns. Two forward and two aft in turrets
	Six 4.7-inch quick-firers
	Eight 6-pounder quick-firers
	Twelve 3-pounder quick-firers
	Torpedo tubes added 1890. 14-inch diameter. One bow. One stern. Two sides
	Alterations 1897
	Six 6-inch quick-firers replaced 4.7-inch secondary armament
Armour	Compound
	Belt 20-inch amidships to 14-inch at ends. 8-inch – 6-inch at lower edge. 230ft long by 8ft 6in wide
	Bulkheads 16-inch forward and 14-inch aft
	Citadel 18-inch – 16-inch
	Turrets 18-inch
	Battery bulkheads 5-inch
	Battery sides 4-inch
	Deck 3-inch
	Conning tower 3-inch
Complement	520

The *Nile* was a sister of the *Trafalgar (Plates 17 and 18)* and cost £885,718 to build. She was completed in July 1890 but her guns and mountings were delayed, so she ran trials with compensating ballast. Submerged



49 *19 NILE, BRITISH 1891*



50 *20 ANDREA DORIA, ITALIAN 1891*

torpedo tubes were fitted to both ships at this time. The *Nile* commissioned in June 1891 for the naval manoeuvres and then proceeded to the Mediterranean to relieve the battleship *Benbow,* remaining there until January 1898.

During 1897 the secondary armament was replaced by 6-inch quick-firers.

The low freeboard of the *Nile* and *Trafalgar* was better suited to the Mediterranean seas and both were regarded as good fighting ships because of their heavy armour and gun power.

On return to England the *Nile* became portguard ship at Devonport. In February 1903 she was relegated to dockyard reserve but commissioned in the reserve the following month. On formation of the Home fleet she received a nucleus crew and became part of the 4th division at Devonport.

In June 1911 the *Nile* was transferred to the "E" division and was offered for sale. During July 1912 she was sold for £34,900 to be scrapped.

The *Nile* was distinguished from her sister by her funnels which were carried up in the form of cowls above the casings.

The bow form of both battleships caused considerable disturbance when steaming at speed and in a small sea spray drove in sheets over the foredeck and the turret.

Andrea Doria

ITALIAN 1891 *Plate 20*

Built	Royal Arsenal, Spezia
Laid down	January 1882
Launched	November 1885
Completed	May 1891
Dimensions	*Length waterline* 328ft 2in
	Breadth 65ft 4in
	Draught 27ft 2in mean. 30ft maximum
Displacement	11,204 tons
Machinery	Twin screw
	Two 3-cylinder vertical compound engines by Maudslay, Son and Field
	Eight cylindrical boilers
	IHP natural draught = 7,500 = 15 – 15.5 knots. Trials
	IHP forced draught = 10,200 16.5 – 17 knots. Trials
Bunkers	Coal. 850 tons normal (Oil fuel added by 1903)
Endurance	4,500 miles at 10 knots
Armament	Four 17-inch 105-ton guns. 27 calibre. Projectile about 2,240 pounds. Two in each barbette
	Two 6-inch breech-loading guns. 32 calibre
	Four 4.7-inch quick-firers. 32 calibre
	Ten 6-pounder quick-firers
	Seventeen 1-pounder quick-firers
	Three 14-inch diameter torpedo tubes. Two submerged. One above water
Armour	*Belt* Partial compound 17.7-inch
	Redoubt and barbettes 17.7-inch
	Bulkheads 14-inch
	Deck 2.9-inch
	Barbette hoods 1-inch
	Conning tower 17.7-inch
Complement	506

The *Andrea Doria* cost about £780,000 and was one of the "Ruggiero di Lauria" class battleships designed under the direction of Engineer Inspector General Giuseppe Micheli, the others being the *Ruggiero di Lauria* and the *Francesco Morosini,* which were completed in 1888 and 1889 respectively.

They carried two pairs of short 17-inch, 105-ton guns in hooded barbettes placed *en echelon* amidships. The general design may be compared with the British *Colossus* and *Edinburgh (Plates 6 and 7)* and with the earlier Italian *Duilio* and *Dandolo,* or the *Italia* and *Lepanto (Plate 8).*

The *Andrea Doria* had the then fashionable low freeboard and symmetrical arrangement which resulted in some unusual ships. The large crane forward and derrick aft were prominent features and the tubular mast seemed heavy with crossed yards for signalling. The light signalling bridges are visible amidships in this photograph taken in 1902. These crossed the ship at the level of the catwalks between the forward and after superstructures.

The *Andrea Doria* was not in action throughout her existance but was regarded as a fleet unit until about 1904, thereafter being relegated. Her two sister ships were discarded in 1909 but the *Andrea Doria* remained on the list until May 1911 when she became a depot ship at Taranto. In February 1915 she was converted to a floating battery and was renamed *GR 104,* as a new battleship was to be named "Andrea Doria". She was towed to Brindisi for defence of its harbour and served there until the end of 1918. Afterwards she was converted to an oil hulk and retained the name *GR 104* until 1929, when she was broken up.

BATTLESHIPS II

British naval manoeuvres of 1888 resulted in a report that the fleet was inadequate to fight a major war against two great powers. This coincided with rumour of war with France, which was massing a battle fleet in the Mediterranean, and Russia was building battleships for the Black Sea fleet. Cordiality between these allies created anxiety in England and resulted in the Naval Defence Act of 1889, intended to boldly strengthen the Navy. It was the most important administrative event in the British Navy during the period covered by this book and provided for seventy new warships being ordered at the then incredible cost of £21,500,000 with treasury support. The intention was to remove seventy-two obsolete ships from the fleet, though eventually only thirty were struck off.

Britain had by far the world's largest and most powerful fleet but contemporary British naval administration was inefficient and uneconomical. There was no organisation for naval war policy or personnel, and logistic support was inadequate. There was little agreement on the need for developing and sustaining a naval programme and the attitude of many high-ranking officers was typified by Admiral Hood who stated he "would have preferred by the end of 1890 to have had six more fast cruisers, but did not consider it a point of vital importance!"

Britain then possessed fifteen effective battleships, with six building. France had nine and five building and Russia three effective and three building. All three nations had many more old ships. To protect trade routes and assure future supremacy Britain needed large numbers of modern cruisers, and a class of new battleships.

Eight first class and two second class battleships were commenced under the act and the eight "Royal Sovereign" class were the finest of the time, with four 13.5-inch guns mounted in two barbettes, forward and aft of the amidship superstructure and ten 6-inch quick-firers as secondary armament *(Plate 24)*. These were good sea boats of 14,360 tons, 380ft long, and steamed at 15 knots but were capable of 17 in short spurts. Belt armour was good but the crews of the main and secondary armament were unprotected, which was a serious weakness, particularly as armour represented 30 per cent of the displacement.

By then the French Navy had adopted cylindrical turrets for the main and secondary armament in the 11,400-ton battleship *Brennus*, designed before the "Royal Sovereign" type. Two large guns were mounted forward and one aft, with secondary guns on two levels and a waterline armour belt. She had the usual tumble home and heavy looking superstructure.

Russian and Italian battleships then building had similar big gun disposition. The three Italian ships were of 13,500 tons and unusual funnel arrangement. They were commenced without side armour but by the time the first was launched, the *Re Umberto (Plate 27)*, quickfiring gun development made armour essential and she had 3.9-inch side armour fitted, but had the barbette and deck armour reduced in compensation.

The "Royal Sovereign" class were all completed within five years and proved superior to any contemporary battleships in power of attack, protection, seakeeping and speed. They were also majestic in appearance, though most battleships then building were basically similar in arrangement.

A feature of the mid 1890's was the readoption of the old sailing navy "line ahead" formation of a battle fleet in action, used in manoeuvres by the British fleet and the German, with others following. Exercises were increasingly recognised as being vital to efficiency but excessive attention was still given in all fleets to paint schemes, cleanliness, and drills of little fighting value. By then square-rig seamanship was not possible in the active fleet and skill in seamanship meant steaming ships in formation and performing intricate manoeuvres. This contributed to the loss of the British battleship *Victoria* in 1893, when the Mediterranean fleet was ordered to execute an apparently impossible inward turning manoeuvre, resulting in collision between the battleship *Camperdown (Plate 13)* and the flagship *Victoria*, which rammed and sunk with great loss of life and prestige.

Russia and France drew closer during the early 1890's and expanded their fleets. This was prompted by growing relations between Germany, Austria and Italy, with France soon to be conscious of German colonial and industrial expansion and of Italy's naval construction, particularly of battleships. In the Black Sea Russia was building more battleships,

presumably to join the French Mediterranean fleet in war. Both were building commerce-raiding cruisers, potentially aimed against the 12½ million tons of British shipping using ocean trade routes. France and Russia combined then owned only 1½ million tons of merchant ships.

However, the French and Russians could not and did not build battleships to equal the numbers and quality of the British, and the situation in 1893 was that Britain had sixteen modern battleships against France's ten and Russia's four. Battleships under construction were in the ratio of six, five and five. These statistics led to a further British programme for seven first class battleships, six cruisers and thirty-six destroyers.

The "Majestic" class ships were of 14,900 tons and were enlargements of the "Royal Sovereign" type but with four 12-inch guns protected by armoured shields above the barbettes and having a rapid rate of fire every 45 seconds. There were twelve 6-inch quick-firing guns in armoured casemates on two decks as secondary armament and other light guns as defence against torpedo boat attack. Speed was 17 knots and bunkers were sufficient to steam 7,600 miles at 10 knots. The Harvey armour belt was of improved steel, only 9 inches thick, which enabled it to cover two thirds of the length and be of greater than usual width. In addition a 3-inch thick sloping deck protected the magazines, boilers and engine-rooms amidships. The "Majestics" were the finest battleships of the time and were the forerunners of many subsequent classes of British battleships *(Plates 32-33)*.

Nevertheless there were critics, worried by the increasing size and cost of such ships, which a few lucky hits or a mine or torpedo might destroy. Some factions in Britain and France favoured smaller capital ships to disperse this risk. Others, rightly, foresaw a competitive "race" between naval nations attempting to outbuild each other with larger and more powerful battleships, resulting in a drain of resources as smaller and older ships quickly became obsolete. These counter arguments were dismissed by most British naval authorities who emphasised that French battleships, for instance, could be smaller as they were intended to operate only in European or Mediterranean conditions, never far from coaling facilities, so did not need the bunker capacity of British ships. The Admiralty had achieved its intention of having a powerful battle fleet of sixteen ships of the combined "Royal Sovereign" and "Majestic" classes: a homogenous force with all the advantages of efficiency, calculated handling and seakeeping. It was the best battle fleet in the world.

In contrast, French battleships continued to be unusual and individual. The 12,000-ton *Charles Martel, Masséna* and *Bouvet* type of 1893-6 reverted to an arrangement of single big gun turrets, with a pair of secondary gun turrets close to them and other secondary guns amidships – a retrograde system as the main armament broadside was reduced to three big guns in favour of obtaining three-gun fire ahead or astern, a doubtful advantage. The usual heavily rounded sides, large military masts, boat decks and funnels made them appear unstable.

In 1894-6 came the three new "Charlemagne" type battleships with twin end turrets and a long, lightly protected battery between them. Tumble home was retained, with sides unprotected below the battery but with the armour belt carried barely above water. During 1898-9 the 12,000-ton *Iéna* and 12,700-ton *Suffren* were launched, with improved protection, but remained curious individual ships. France seemed to be falling behind in battleship design until the "République" class ships were commenced in 1901, when displacement rose to 14,800 tons, excessive tumble home was abolished and the distribution of armament and armour resembled contemporary British battleships, though the armour was more concentrated and many considered the "Républiques" as the best protected ships afloat.

The proving of contemporary battle methods and ships occurred unexpectedly in the Far East during a war between China and Japan in 1894. China had a modest fleet of mixed ships headed by two 7,430-ton battleships of German build and two smaller armoured ships. The small but efficient Japanese fleet was handicapped by having only three old armoured ships but had several modern protected cruisers with quick-firing guns. A dispute arose over troop concentrations in Korea and war resulted. Chinese warships clashed with Japanese off the river Yalu in September 1894 and a naval battle developed. The four Chinese armoured ships were supported by six cruisers of various types. The Japanese attacked with the fast protected cruisers which put rapid fire into the Chinese ships, backed by the larger guns of the armoured craft. They ended the action circling the two largest Chinese battleships which were almost disabled. However, the *Chen Yuen* put one 12-inch shell into the cruiser *Matsushima,* which caused tremendous destruction and put her out of action. Four Chinese ships were sunk by gunfire and one was lost in collison, but their battleships again proved the value of armour, as despite about two hundred hits by quick-firing guns it remained intact and casualties in both ships were low. The action also proved the "line ahead" formation best for contemporary fleet battles, which in this case was indecisive as both fleets retired, but the Japanese had gained control of the surrounding sea, enabling their offensive to continue.

Flushed with success, Japan had ambitions to become a naval power and during 1894 ordered the 12,300-ton battleship *Fuji* in Britain *(Plate 38)*. She was virtually a reduced "Royal Sovereign". Two years later two more battleships of 15,000 tons were ordered in Britain, which became the naval mentor of the Japanese, who were regarded by the British government as a potential ally to offset Russian influence in the Far East.

Russia watched the emergence of a militant Japan with apprehension and, concerned for her Far East territory, commenced construction of eight battleships which had French influence in the design, with long or complete waterline belts, curvature of side, high freeboard, large areas of unprotected side and big superstructures. Their stability was suspect, probably due to the weight of the main and secondary armament being

mounted in turrets.

The emergence of two major battleship-owning powers outside Europe shocked Britain, as they could not be blockaded in war or be fought by the British fleets in home or Mediterranean waters. However, the China station was immediately reinforced with second class battleships of the "Centurion" class *(Plate 29)*. The ships were of light draught, enabling them to use the Suez canal and steam quickly to the Far East.

Britain's world-wide naval superiority was now threatened and alliances were contemplated with America and Japan to cover the Pacific. The American fleet had lapsed into coast defence lethargy for twenty-five years following the civil war, placing faith in clumsy coast defence monitors and a few cruisers. America still regarded the Atlantic and Pacific oceans as sure bulwarks against foreign interference in the steady growth of industrial eastern America and the settling of the west. The real barrier, however, was the British Navy, though no true American would have admitted it. American fleet expansion commenced in 1890 and reflected the mood of the nation to assert itself, backed by the continent's great resources and expanding trade.

Three "Indiana" class battleships were laid down – 10,200-tonners similar to the later "Royal Sovereign" type but with paired turrets for the main and secondary armament, resulting in low freeboard. These ships were heavily armed with four 13-inch guns backed by eight, paired 8-inch and four 6-inch – all breech loading. But they were indifferent seaboats and top speed was 16 knots.

The *Iowa* followed in 1896, then the two "Kearsarge" class and three "Alabama" class battleships of 1898 *(Plate 44)*. The "Kearsarge" type were distinguished in having the 8-inch secondary gun turrets mounted above the main armament turrets and moving with them, which would have been a serious weakness in action. The "Alabama" type were much better ships with four 13-inch and fourteen 6-inch quick-firers as secondary armament.

Before these ships were completed the Spanish-American war began in April 1898, in which the two fleets played a considerable part. Insurgent action in Cuba, then a Spanish colony, contributed to the war which flared after the sinking of the American armoured ship *Maine* by an explosion in Havana harbour during February 1898, with great loss of life. A force of Spanish cruisers and destroyers cruised in the West Indies and entered Santiago de Cuba, where they were blockaded by an American squadron. In July this Spanish force attempted to break out, with orders to fight its way clear or certainly perish in a daylight battle between four armoured cruisers versus battleships and armoured cruisers in superior numbers. The American ships fired about 8,000 rounds but made only one hundred and twenty-one recognisable hits on the Spaniards, which nevertheless beached in flames after a gallant but hopeless fight. Most damage was inflicted with the 8-inch guns, causing subsequent American battleships to continue mounting them as secondary armament.

American naval victories at Santiago and against a weak Spanish squadron in Manila Bay further demonstrated the rapid development of sea power when backed by the resources of an industrial nation.

Spain then had only one battleship, the 9,950-ton *Pelayo,* and she was not involved in any action.

After cessation of hostilities America purchased the Philippine Islands in the Pacific and acquired Puerto Rico and Guam, besides establishing a naval base in Cuba. With new world power status America ordered new battleships and spent large sums on expanding the fleet, which by 1907 was second in numbers to the British.

During 1898 British and French relations reached flashpoint when colony-seekers from both countries met and clashed at Fashonda in the Sudan. The incident threatened war and the French fleet at Toulon mobilised and British warships and fleets were alerted. But the mobilisation was defensive; the French fleet were unprepared for a major war and when Russia would not become involved, the French withdrew from the Sudan. Britain had safeguarded her Suez Canal-Red Sea route to the East by flexing her sea power.

With his "Majestic" type battleships setting the trend, British naval constructor White directed the design of many subsequent classes of battleships developed from them: the six "Canopus" class *(Plate 41)*, three "Formidable" class *(Plates 42 and 43)*, five "London" class *(Plates 47 to 50)*, six "Duncans" *(Plate 51)* and eight "King Edward VII" class *(Plates 52 to 54)*.

These maintained Britain's lead over any other nation, or the traditionally feared combination of France and Russia. As by then France obviously could not hope to compete with the British battle fleet, she increasingly experimented with submarines, and in 1901 the *Gustav Zede* was the first successfully to "torpedo" a battleship moving during exercises. This, the French were convinced, was the weapon which could destroy or immobilise Britain's battle fleet. Britain remained faithful to the battleship as the ultimate naval vessel, but began to build submarines to gain experience with what was for many years regarded as an underhand weapon. However, before an extensive French submarine policy could develop, Britain and France came to a political understanding against Germany, which was emerging as a potential common enemy.

German trade and industry had expanded rapidly from 1880-1900, overtaking Britain in production of iron and steel. Germany was energetically pursuing a growing colonial and trade policy which began to impinge on British interests and affect British business. A bitter rivalry began to replace the friendly feelings which had existed between the two countries until the 1880's and soon grew to enmity.

Eight small armoured ships were built for German coast defence between 1889-95, the first armoured ships built for the fleet since 1880.

Four 10,000-ton battleships of the "Wörth" type were laid down in 1890 *(Plates 22 and 23)* and were more advanced in design than any

contemporary ships, with six 11-inch guns in paired turrets on the centreline, backed by ten 4.1-inch quick-firers. The speed of 16 knots was low but they were well armoured and stable.

The five 11,000-ton "Kaiser" class which followed reverted to a small armament of four 9.4-inch and twelve 5.9-inch, with the after turret mounted on a low freeboard deck *(Plate 40)* but these ships steamed at 18 knots.

Naval expansion was avidly encouraged by the Emperor Wilhelm II and when Admiral Tirpitz was appointed minister of marine in 1897 the German fleet surged ahead. A year later a naval law required construction of a seagoing battle fleet to raise the German Navy from a coast defence force to one intended to rival Britain in her home waters and show Germany's new status as an industrial and mercantile power.

The war between Britain and the Boers in South Africa at the end of the century, which brought seizure of German shipping suspected of aiding the Boers, expanded German desire for sea power and during 1900 a supplementary naval bill increased the battleship programme to thirty-eight, and cruiser building to thirty-two, with four battleships and seven cruisers in reserve.

While French, Italian, Austrian and Russian fleets and naval administrations could be regarded with equanimity by Britain, this determined new German surge to naval might could not; it was well organised and backed by great industrial resources. But the Germans still had limits to their naval expenditure and battleship dimensions were restricted by the depth of the Kiel canal which linked her naval bases in the Baltic and North Sea.

The five "Wittelsbach" type battleships built under the 1898 programme had only four 9.4-inch guns, though these had a rapid rate of fire and were backed by eighteen 5.9-inch quick-firers. Five further battleships built under the 1900 programme had four 11-inch guns which, though still smaller than those of other fleets, were accurate and efficient in rate of fire. All German battleships were well subdivided to restrict damage and, hopefully, to enable them to return to port for repair.

All this was a new and potentially dangerous threat to Britain whose naval policy for many years had been directed at maintaining naval supremacy over France, the assumed immediate adversary, and against Russia which was then reckoned a secondary foe of unknown naval capability. Now all this was changing and the principal force of the British fleet would have to be concentrated in home waters instead of spreading its force throughout the world, and particularly in the Mediterranean. Meanwhile gunnery science was not advancing as fast as the development of hulls, gun construction and armour. Naval guns were still laid on the target independently, with elementary sights, and in a seaway it was good shooting to hit a target at 1,500 yards. Naval thought was that actions should be fought at the closest possible range and gun drills and gun cleanliness were more important than spotting the fall of shot and developing accuracy at sea. Paintwork was spoiled by flash and gunsmoke, which annoyed officers to whom smart appearance of the ship and quick execution of drills and manoeuvres were the signs of efficiency.

After the long period of general peace most fleets were complacent about their gunnery, but range-finders were installed in British battleships in 1892 and in other fleets soon after, and some enthusiastic officers were attempting to raise the fleet's interest in gunnery, handicapped by firing orders still transmitted by bugle and exercises satisfied by a high proportion of near misses to the target. French naval gunnery was claimed to be superior to the British, and the American was worse.

The leader in developing efficient firing methods was Captain Percy Scott of the British Navy. His first command, the protected cruiser *Scylla (Plate 74)*, was used to develop his methods which scored 80 per cent hits at the annual 1898 prize firing, leaving the fleet feeling that the *Scylla* had cheated somewhere, as the average score was 30 per cent in ideal target conditions. Scott's zeal spread to others and a wave of gunnery enthusiasm and new methods spread rapidly through the British fleet. By 1903 its gunlayers were following targets in a seaway with telescopic sights.

American naval gunnery was poor before 1903 but after Scott had discussed his methods with a Lieutenant Sims, later a famous admiral and gunnery specialist, his theories spread throughout the American Navy which became proficient very quickly. This cooperation was typical of the growing friendly relations between the two navies, which has always existed since.

During 1902 Japan became allied to Britain in an attempt to limit Russian expansion in Korea and Manchuria. Russia then had seven battleships based on Port Arthur, in Korea. During February 1904 the Japanese attacked this naval anchorage with torpedo craft as a declaration of war, a situation not unlike that of Pearl Harbour almost forty years later. No offensive or defensive measures had been taken by the Russian ships, and as two battleships were damaged this brought near parity with the Japanese battleship force. This war developed into the largest involving major fleets since the evolution of the steam battleship and the naval battles were followed keenly by all fleets, particularly by the British observers on board many Japanese ships, which were largely British-built or designed and were manned by officers and men influenced by British training and traditions, while Russia's best battleships were heavily influenced by the French.

There were various early naval clashes, and meanwhile, Japanese troops had landed in Korea and were pushing towards Port Arthur, where Vice-Admiral Makaroff had taken command to instil spirit into the Russian squadron with seagoing exercises and sorties which rapidly raised efficiency. Unfortunately his flagship, the battleship *Petropavlosk*, struck a mine during a sortie and the admiral and all but thirty men were drowned. His ability had been the Russian fleet's hope, and Admiral Vitgeft who succeeded him was a cautious commander. As Japanese

troops advanced on Port Arthur he decided to break out and attempt to steam the squadron to Vladistock before it was trapped by a combined military and naval blockade.

The Japanese main fleet, under its commander-in-chief Admiral Togo, met the six Russian battleships, four cruisers and destroyers, with four battleships and four armoured cruisers. Togo was fighting with the whole battleship strength of Japan; the Russians had more battleships in the Baltic and Black Sea. So Togo kept the range long at 7,000 yards, well beyond the range of the smaller guns in his fleet. The Russian ships made good shooting at this long range, repeatedly straddling the Japanese, and as the long daylight action went on the Japanese flagship *Mikasa* was being seriously damaged. The Russian squadron was punishing the Japanese as it escaped until a chance shell struck Vitgeft's flagship *Tsarevitch* in the conning tower, killing the admiral and damaging the ship, which turned towards the Japanese line, throwing other Russian ships into disorder. The admiral next in command ordered them to follow him back to Port Arthur and the Japanese closed in to quick-firer range but lost the pursuit in darkness, under cover of which the Russian ships split up. A few months later Japanese field guns were shelling the trapped Russian ships which took no further part in the war.

That night the *Tsarevitch* steamed south to the neutral German colonial port of Kiaochau and internment. Although struck by about fifteen 12-inch shells and lighter ones, her armour belt and turrets were intact. The cruisers *Askold*, *Novik* and *Diana*, with four destroyers, also reached neutral ports.

Had it not been for the chance hit on the *Tsarevitch* the Japanese would probably not have contained the Russian squadron and the course of the whole war would have altered – but history is punctuated with "ifs".

This clash made Russia determined to crush the Japanese fleet and ships were assembled from the Baltic fleet for an epic voyage round Europe and Africa, across the Indian Ocean and round Asia to attempt an avenging defeat on the Japanese. Lacking homogeneity, this large force of battleships, cruisers, destroyers, supply ships and colliers was headed by four new "Borodino" class battleships of 13,500 tons, which were similar to the *Tsarevitch* with four 12-inch and seven 6-inch guns in paired turrets and a complete waterline armour belt 10-inches thick. Tumble home and a large superstructure, added to overloading with coal and stores for the long voyage, made them bad sea boats for this passage.

This "2nd Pacific squadron" sailed from Kronsdat in September 1904 commanded by Admiral Rozhestvensky. During passage of the North Sea in October they sighted the working flares of English trawlers on the Dogger Bank, and due to the close relations of the British and Japanese fleets, these were thought to be signals between Japanese destroyers, perhaps British-built, which were waiting in the North Sea. Nothing else could explain why the flagship *Suvoroff* opened fire towards the flares, followed by the rest of the fleet. Four Hull trawlers were set on fire and another was sinking, there were dead and injured trawlermen and England was in a ferment. The Channel squadron prepared for war and cruisers were despatched to shadow the Russians, becoming particularly provocative as they passed down the coast of Spain, steaming close abreast the Russian ships at night and following them by day. The excitement faded as the Russian fleet steamed round Africa's west coast, coaling in French or German colonial ports from chartered German colliers.

When Rozhestvensky arrived at Madagascar he received news of the fall of Port Arthur, but other Russian ships were steaming to join him via the Suez Canal, and early in March he sailed for the Sunda Islands, coaling at sea in the Indian Ocean with barges carried by the colliers. The fleet coaled again off Indo-China, after passing Singapore, and met reinforcements led by the old 9,700-ton battleship *Nicholas I*, with three coast defence ships.

The Russian squadron steamed up the Chinese coast towards the Straits of Tsushima, where Rozhestvensky formed single line ahead with the *Suvoroff*, *Alexander III*, *Borodino* and *Oryol*, followed by the *Osliaba* and the older battleships, then the almost useless coast defence ships. He expected to meet Togo, who converged unseen with four battleships backed by eight, well-designed armoured cruisers; all able to steam at 18 knots to the Russian fleet's 9 or 10, after the long voyage.

Togo's fleet mounted sixteen 12-inch guns and one hundred and twelve 8- and 6-inch guns. The Russian squadron had twenty-six 12-inch, of which only sixteen were modern weapons, seventeen 10-inch and one hundred and twenty-one 8- and 6-inch. The Japanese fleet was enthusiastic and well tried; the 2nd Pacific squadron was weary of a long and extremely difficult voyage and most of its seamen sensed doom. As the fleets converged for action the Russians opened fire at 6,500 yards, with an accuracy which unsettled the Japanese. Fighting became general with the two fleets steaming on parallel courses and firing at 5,500 to 5,700 yards range. The larger Japanese ships concentrated on the *Suvoroff* which, although adroitly handled, was damaged and on fire when she fell out of line. Japanese cruisers attacked the *Osliaba* and sank her. Meanwhile the striken *Suvoroff* continued to fight and the other Russian ships were circling away from the Japanese which, in two lines, fired into them as guns would bear. The Russians replied spiritedly, though many were on fire. Battle raged into the afternoon and the new Russian flagship, the battleship *Borodino*, led surviving Russian ships which could steam adequately on a course for Vladivostok as mist and smoke veiled them from the enemy. But Togo soon overtook these remnants and shattered the *Alexander III* and *Borodino*. At dusk Japanese destroyers attacked the ships reforming astern of the *Nicholas I*, flagship of the little damaged third division.

Meanwhile Rozhestvensky and his staff had transferred from the still fighting *Suvoroff* to a destroyer, and when Japanese destroyers closed in to attack the *Suvoroff* the battleship's crew opened heavy fire, but the ship

was sunk with three torpedoes. During the night torpedo attacks sank two old Russian battleships and a coast defence ship. Another old battleship had been sunk earlier by the gunfire of Japanese cruisers and at dawn only four Russian battleships were steaming for Vladivostok, with the *Oryol* the only remaining modern ship, but badly damaged. Togo again overhauled them and the Russian ships surrendered rather than be uselessly annihilated.

Rozhestvensky's destroyer was later captured by the Japanese and what came to be known as the Battle of Tsushima ended in disaster for Russia's fleet, relieved only by the tenacious heroism of its officers and men, who from the start had an impossible task. Japan had achieved command of the sea and her armies were victorious on land, giving her clear victory: a lesson and a warning to other fleets.

Throughout the battle superior Japanese speed enabled Togo to choose the range, and his gunners fired only when the guns would bear. The Russians were desperate to damage the Japanese and fired rapidly and constantly, whether they could see a target or not, though much of their shooting was more accurate than the Japanese expected. Tsushima was fought when all major fleets were fast changing their gunnery methods. These were quickly becoming more organised, with fire control from positions independent of the turrets (usually aloft in a new version of the old fighting top), from where the fall of shot could be spotted, ranges taken and deflection corrections made. By then battle practice firing in the British fleet was at 5,000–6,000 yards and long-range gunnery was developing under the general direction of Admiral Sir Percy Scott. Gunnery replaced smart paintwork as the fetish in navies, encouraged by an increasing rivalry and enthusiasm among not only the large powers but almost every nation with a fleet.

Everywhere, nations large and small were ordering warships. The Scandinavian coast defence navies were rivalling each other with new designs. In 1898 Norway ordered the 4,000-ton miniature battleships *Norge* and *Eidsvold* in Britain *(Plate 45)*. Demark embarked on a series of three 3,700-tonners including the *Olfert Fischer (Plate 56)* and Sweden built nine coast defence armoured ships between 1896 and 1906, when the 4,700-ton *Oscar II* was launched *(Plate 55)*. Although coast defence ships had very limited fighting value most were very long lived and many of the Scandinavian battleships were still serving during World War II.

Long-range gunnery continued to develop in major fleets, and as the spotting of falling shells around an enemy ship was best done if the shells were all of one size, this contributed to the desire of American, Italian and British naval architects to design battleships with the largest possible number of all big guns instead of the four 12-inch then generally fitted, backed perhaps by four 9.2-inch and ten 6-inch, as in the British "King Edward VII" class, or by eight 8-inch and twelve 7-inch in the American "Connecticut" type. The 12-inch gun was retained in the planning of the various projected ships as the best available weapon, firing perhaps two shots each minute and well proved in the recent Japanese fleet actions against Russia.

During 1903 the Italian naval constructor Cuniberti writing in 'Jane's Fighting Ships', proposed an ideal battleship for the British fleet: a 17,000-ton ship armed with twelve 12-inch guns and capable of 24 knots. Early in 1905 the Americans authorised two battleships to mount eight 12-inch guns on a displacement of 16,000 tons, with a light secondary armament of twenty-two 3-inch guns. If Britain was to commission the first all big gun battleship she had to act quickly. Sir John Fisher was then First Lord of the Admiralty and this energetic personality had plans rushed out for a 17,900-ton ship with ten 12-inch guns in five paired turrets, not all on the centreline, as in the American ship. Design was directed by Philip Watts, who became Director of Naval Construction in 1903, and it was made more revolutionary by the choice of steam turbines for propulsion machinery, which had previously been tried in nothing larger than a cruiser, though it had been developed by Sir Charles Parsons' company since 1892, with increasing success. As this new battleship was experimental she was to be built as an individual ship then, if proved successful and when fully evaluated, classes of improved ships were to be built. She was built in a year and a day at Portsmouth dockyard, whose usually sedate progress was abandoned in the rush to build the *Dreadnought*, as she was to be named *(Plates 57 and 58)*. The keel was laid in October 1905 and building time was shortened by use of steel and armour intended for other ships, and the guns and turrets from the almost as large but more conventionally armed battleships *Lord Nelson* and *Agamemnon*, which had been begun in May 1905 and were temporarily stopped while the *Dreadnought* was building.

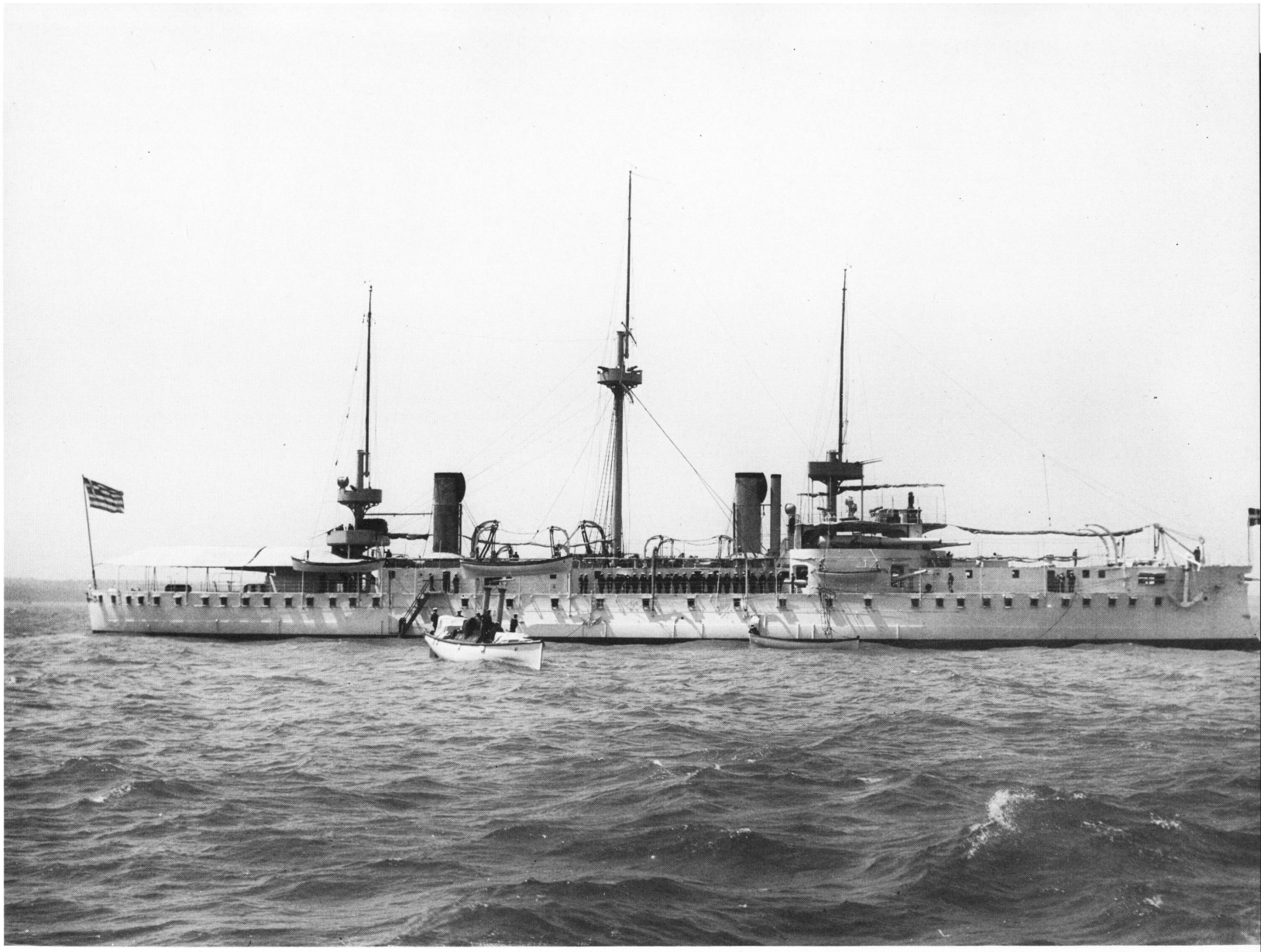
The all big gun *Dreadnought* proved a success and orders were given to go ahead with a "Dreadnought" class of battleship. Once again, all navies were now equal in effective battleship strength, apart from Britain's short-lived advantage of one ship.

The completion of the *Dreadnought* in 1906 opened a new phase in battleship design and international rivalry which ended in the 1914-18 war. Battleships built before her and after 1889 became generally known as "pre-Dreadnoughts" and were rendered obsolete in the battle line as the *Dreadnought*'s successors and rivals grew in numbers which are beyond the scope of this book.

Psara

GREEK 1892 *Plate 21*

Built	Granville, France
Laid down	1887
Launched	February 1890



59 *21 PSARA, GREEK 1892*

Completed	1892
Dimensions	*Length overall* 334ft 6in
	Length waterline 331ft
	Breadth 51ft 8in
	Draught 23ft 3in
Displacement	4,885 tons
Machinery	Twin screw
	Two 3-cylinder compound horizontal engines (later triple expansion)
	Four cylindrical type boilers by Forges & Chantiers de la Méditerranée
	IHP = 6,700 = 17 knots
	Speed 14.5 knots
Bunkers	Coal. 400 tons normal. 690 tons maximum
Armament	Two 10.6 inch. 36 calibre. Breech loading by Canet. In forward redoubt
	One 10.6-inch breech-loading gun by Canet. 30 calibre. In hooded barbette aft
	Five 5.9-inch quick-firers by Canet. One on centreline between 10.6-inch in redoubt. Remainder in armoured battery
	One 3.9-inch quick-firer. In bow
	Eight 9-pounder quick-firers. 50 calibre
	Twelve 1-pounders
	Four machine-guns
	Torpedo tubes. One 15-inch diameter torpedo tube in bow above water. Two 14-inch diameter torpedo tubes above water
Armour	Creusot. Steel
	Belt 11.8-inch – 4.7-inch
	Upper belt 3-inch
	Battery forward 13.7-inch
	Barbette aft 11.8-inch
	Barbette hood 6-inch
	Protective deck 2.3-inch
	Conning tower 12-inch
Complement	400

The *Psara*, and her sister ships *Spetsai* and *Hydra* were small battleships designed and built in France for Greek conditions. The disposition of armament was unusual: two of the 10.6-inch guns were mounted in an armoured redoubt forward, the other in a hooded barbette aft. Only two of these guns could fire ahead or on the beam at one time and only one astern. One of the secondary 5.9-inch guns was mounted on the centreline between the two 10.6-inch and the others were a deck lower, in the armoured battery under the redoubt. These ships were well sub-divided, having one hundred and eighteen watertight compartments. When built they had three masts of almost equal height, each having a fighting top. The *Psara* had her masts altered in 1897 when she underwent a major refit at the French yard of La Seyne. The forward and after masts were lowered as shown in this photograph taken in 1902. The large rectangular side ports provided excellent light and ventilation but were vulnerable in a warship.

All three ships were reconstructed; the *Psara* in 1897 and the others during 1899-1900. They were the pride of the Greek fleet when war commenced between Greece and Turkey in April 1897. The Turkish fleet was superior in numbers and armament, but was almost totally laid up and disorganised. The Greeks controlled the sea but lost heavily on land and the war ended on 20th May with an armistice agreed when Russia applied pressure to Turkey.

During the Greek-Balkan league war against Turkey of October 1912 to May 1913, the *Psara*, *Spetsai* and *Hydra*, supported by the powerful armoured cruiser *Giorgios Averoff*, built in Italy in 1911, formed the backbone of a Greek fleet, including fourteen good destroyers and one small submarine, besides older and smaller ships. Her allies Bulgaria, Serbia and Montenegro had very limited naval forces and the seafaring Greeks faced the Turkish Navy alone.

On October 18th 1912 the *Psara* was part of a force, under Rear-Admiral Condouriotis, which included the *Spetsai*, *Hydra*, *Averoff*, fourteen destroyers, five modern torpedo boats, the submaine *Dolphin*, minelayer *Ares*, a hospital ship, troopships and auxiliaries which occupied the island of Lemnos and other islands in the approaches to the Dardanelles. During December 1912 Turkey signed an armistice with the allies of Greece, leaving her fighting on alone. The *Psara*, with her sisters and the *Averoff*, screened by destroyers, patrolled the approaches to the Dardanelles, and on December 16th a Turkish squadron sortied from anchorage. The squadron included the battleships *Torgut Reis* and *Heireddin Barbarossa (Plate 23)*, the armoured ships *Messudieh* and *Assar-I Tewfik*, the light cruiser *Medjidieh* and eight destroyers. After a short action in which the Greeks took the initiative, the Turks turned away and retired. The *Psara* was undamaged but her sisters and the *Averoff* were hit and damaged. The Turks came out again on January 18th 1913, with the four armoured ships, and another action ensued but with the Greeks showing boldness and inflicting much damage.

The fast Turkish cruiser *Hamidieh* escaped from the Dardanelles unobserved on January 14th, shelled the Greek island of Syra and fired on the Greek armed merchant cruiser *Macedonia*, which was severely damaged. The *Hamidieh* proceeded to Port Said and the Red Sea before returning to the Mediterranean where, after steaming to Beirut, she entered Malta due to stress of weather. The *Psara* and four destroyers were sent in pursuit, being the only Greek ships which could be spared from the blockade. However, the slow *Psara* had no hope of catching the Turkish cruiser and by March 11th the *Hamidieh* was shelling Serbian ports in the Adriatic. She afterwards steamed to the Red Sea where she remained until the end of the war rather than run the Dardanelles blockade.

Hostilities ended in May 1913.

Throughout this war the Greek fleet was principally dependent on the armoured cruiser *Averoff* as its main offensive weapon, the three old battleships having limited value. This caused the Greek government to purchase the old American "pre-Dreadnought" type battleships *Idaho* and *Mississippi* to counter Turkish acquisition of the similar ex-German battleships *Kurfürst Friedrich Wilhelm* and *Weissenburg* which were renamed *Heireddin Barbarossa* and *Torgut Reis*.

During 1913 it was proposed to refit the *Psara* and her sisters but this does not seem to have been done.

Greece entered World War I as an ally of Britain and France after July 1917, and once again the *Psara* was on active service. She and the *Hydra* were sold out of the Navy in 1920, but the *Spetsai* remained in service as a training ship until 1929 when she also was sold.

Brandenburg

GERMAN 1893 *Plate 22*

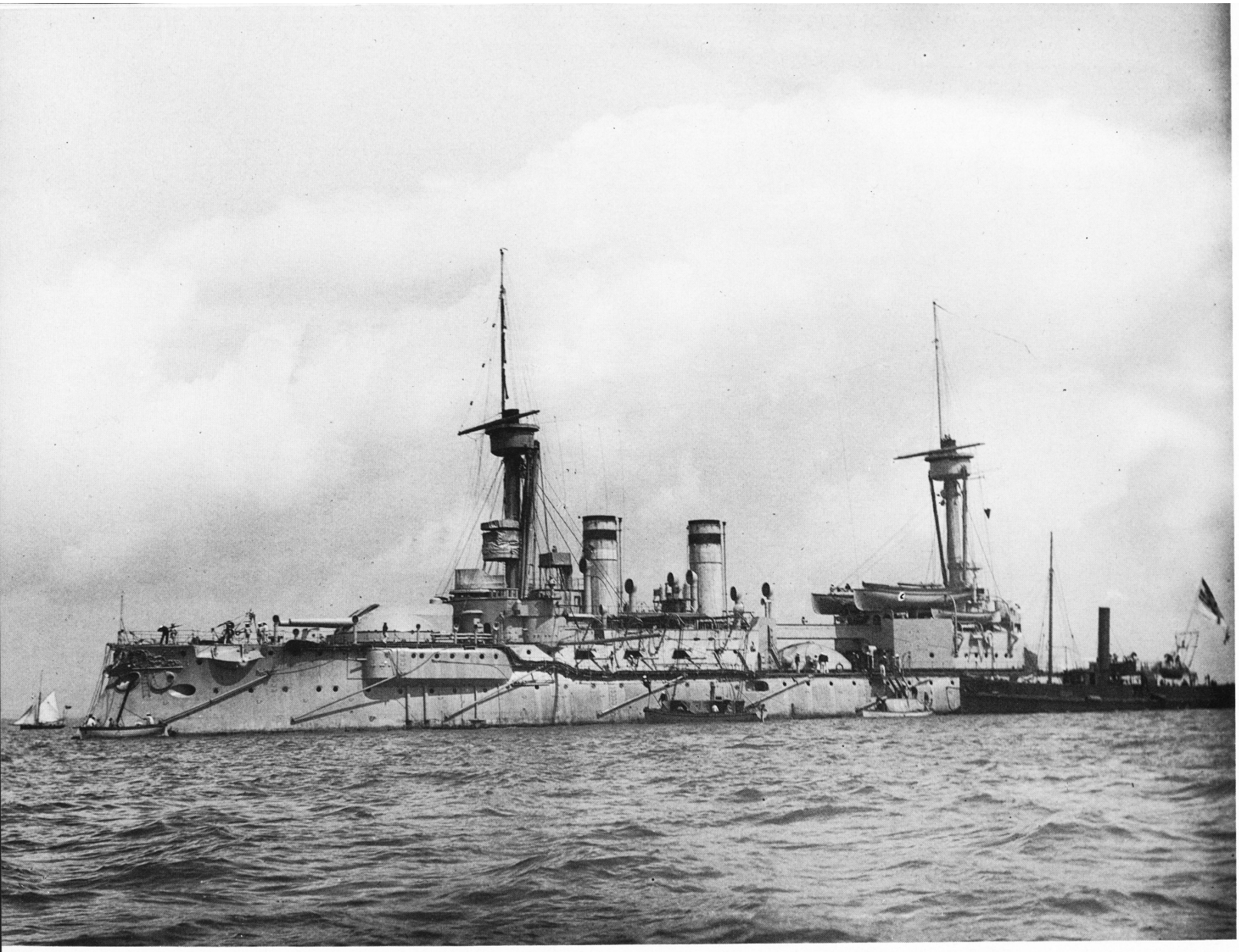
Built	A.G. Vulkan. Stettin
Laid down	1890
Launched	September 1891
Completed	1893
Dimensions	*Length overall* 380ft 6in
	Length waterline 354ft 3in
	Breadth 65ft 6in
	Draught 24ft 4in mean. 26ft 6in maximum
Displacement	10,062 tons
Machinery	Twin screw
	Two 3-cylinder vertical triple expansion engines
	Twelve cylindrical boilers
	IHP natural draught = 8,000
	IHP forced draught = 9,000 = 16 knots
Bunkers	Coal. 640 tons normal. 1,040 maximum
Endurance	4,500 miles at 10 knots
Armament	Four 11-inch Krupp guns. 40 calibre. Two forward and two aft in barbettes with shields
	Two 11-inch Krupp guns. 35 calibre. Two in barbettes amidships with shields
	Six 4.1-inch quick-firers. 30 calibre. In battery amidships. Two more 4.1-inch guns added 1903. Total eight
	Eight 3.4-inch quick-firers. 30 calibre. On after superstructure and in forward sponson
	Twelve 1-pounder quick-firers
	Eight machine-guns
	Five 18-inch torpedo tubes. One, stern. Two on each side
Armour	*Belt* 15.7-inch – 11.8-inch. Full length
	Barbettes 11.8-inch
	Barbette hoods 5-inch
	Casemates for 4.1-inch guns 3-inch
	Protective deck 3-inch
	Conning tower 11.8-inch
Complement	575

The *Kurfürst Friedrich Wilhelm, Brandenburg, Weissenburg (Plate 23)* and *Wörth* were laid down during 1890 as the first German battleships to be built since the "Baden" type, constructed between 1877-80. German designers thus avoided the low-freeboard type ships of the 1880's and the arrangements of their new ships were advanced and powerful. Contemporary ships in the British fleet were the "Royal Sovereign" class *(Plate 24)* mounting four 13.5-inch guns in barbettes forward and aft, compared to the "Kurfürst Friedrich Wilhelm" type with six 11-inch guns in three barbettes with armoured shields; better protected and with one and a half times the potential hitting power.

Although these ships did not attract much attention at the time, their main armament was a considerable advance on their contemporaries' and foreshadowed the "Dreadnought" type of fifteen years later. The amidship barbette, with its short guns, was only effective for firing abeam but was well placed for use at sea, being in the steadiest part of the ship, sheltered by the superstructures. Subsequent development of German battleships stemmed from these ships, which had a grim and businesslike appearance slightly relieved by the scrollwork at the stem. The heavy tubular masts and enclosed tops contrasted with the lighter ones of British ships, and the raised forecastle made them good sea boats, despite the mounting of the forward barbette closer to the stem than in most similar battleships. Unlike the "Royal Sovereign" class these were not elegant ships – the deckhouses, forward accommodation and gun sponsons destroyed their symmetry – but they were excellent fighting ships.

This photograph of the *Brandenburg* was taken in 1898 and shows among other features the cupola-shaped barbette shield amidships, the small-diameter ventilator cowls, the enclosed wheelhouse sunk into a comparatively small and screened bridge with conning position above, derrick stowage on each mast, and the stowage of boats on the after deckhouse which was connected to the forward superstructure by a flying bridge above the amidship barbette. A working party at the stem is painting the cable, while launches and boats lie at the booms and a dockyard craft noses alongside with stores.

These four battleships remained the principal force of the German fleet until the completion of the "Kaiser" class ships in 1898-1901, although, strangely, these reverted to a main armament of four 9.4-inch guns with a strong secondary armament *(Plate 40)*.



62 *22 BRANDENBURG, GERMAN 1893*

As the 1st division of the 1st squadron of "ships of the line", a term revived at that time in the German fleet, these four battleships were sent to reinforce the international forces in China during the Boxer rebellion of 1900.

During 1902-4 the *Brandenburg* and her sisters were reboilered and partially reconstructed. During 1910 the *Weissenburg* and *Kurfürst Friedrich Wilhelm* were sold to Turkey but the *Brandenburg* and *Wörth* remained in service with the German fleet, even though outdated. At the start of World War I the *Brandenburg* was used as a coast defence ship until 1915 but was disarmed during 1916 to become an accommodation and distillation ship at Libau. Later it was intended to use her as a target ship for the fleet but this was cancelled as the war developed. After Germany's surrender the *Brandenburg* was discarded in May 1919 and during 1920 was scrapped at Danzig, with her sister ship *Wörth*.

Weissenburg (later Torgut Reis)

GERMAN 1893 *Plate 23*

Built	A.G. Vulkan. Stettin
Laïd down	1890
Launched	December 1891
Completed	1893
Dimensions	*Length overall* 380ft 6in
	Length waterline 354ft 3in
	Breadth 65ft 6in
	Draught 24ft 4in mean. 26ft 6in maximum
Displacement	10,062. tons
Machinery	Twin screw
	Two 3-cylinder vertical triple expansion engines
	Twelve cylindrical boilers
	IHP natural draught = 8,000
	IHP forced draught = 9,000 = 16 knots
Bunkers	Coal. 640 tons normal. 1,040 tons maximum
Endurance	4,500 miles at 10 knots
Armament	Four 11-inch Krupp guns. 40 calibre. Two forward and two aft in barbettes with shields
	Two 11-inch Krupp guns. 35 calibre. Two in barbette amidships with shield
	Six 4.1-inch quick-firers. 30 calibre. In battery amidships
	Two more 4.1-inch guns added 1903. Total eight
	Eight 3.4-inch quick-firers. 30 calibre. On after superstructure and forward sponson
	Twelve 1-pounder quick-firers
	Eight machine-guns
	Five 18-inch torpedo tubes. One, stern. Two each side. All submerged.
Armour	*Belt* 15.7-inch – 11.8-inch. Full length
	Barbettes 11.8-inch
	Barbette hoods 5-inch
	Casemates for 4.1-inch guns 3-inch
	Protective deck 3-inch
	Conning tower 11.8-inch
	Complement 575

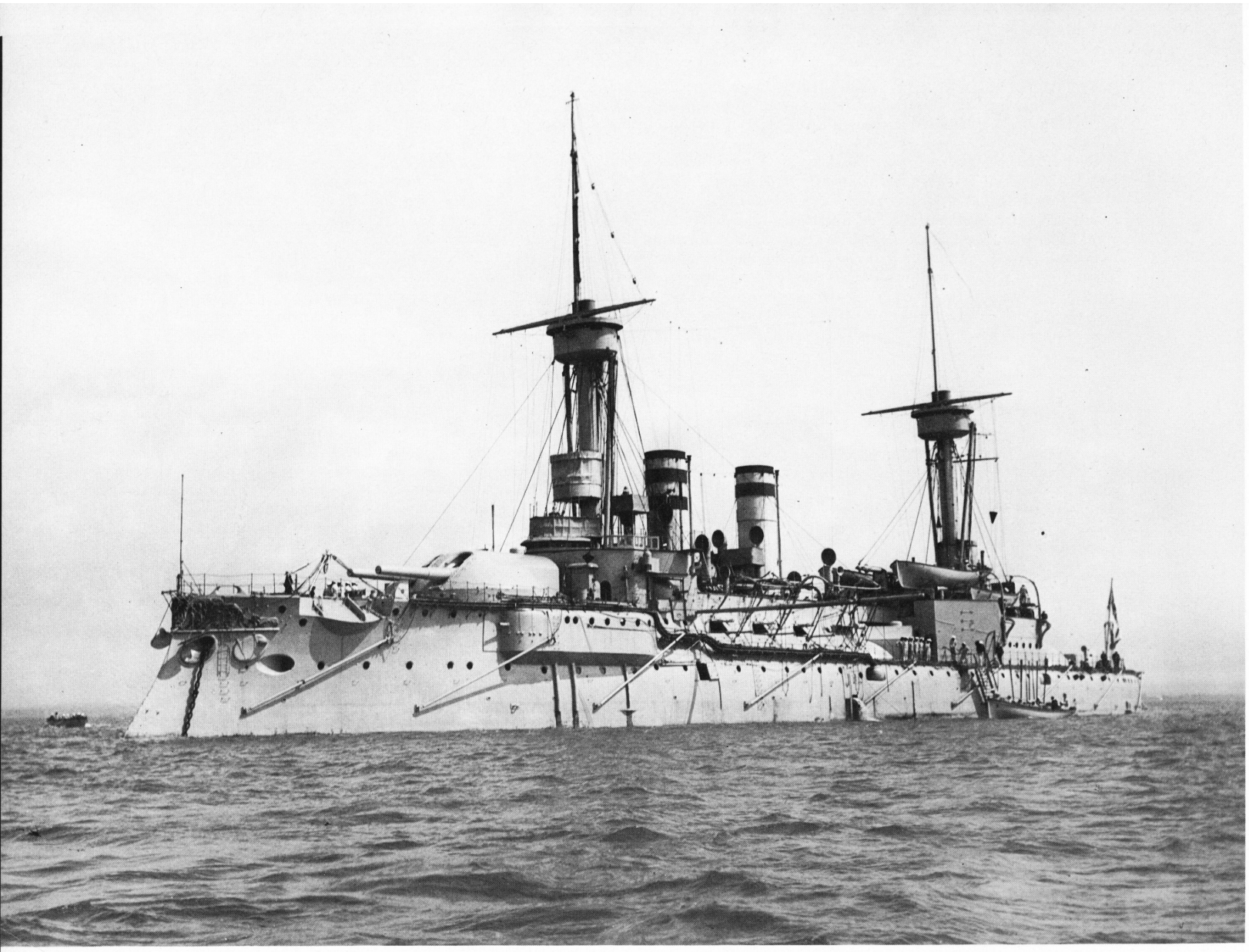
The *Weissenburg*, another of the "Kurfürst Friedrich Wilhelm" class battleships, was sister to the *Brandenburg* and *Wörth*. The *Weissenburg* served with the German fleet in the North Sea and the Baltic and was visiting England when this photograph was taken in 1898. She was refitted and reboilered at Wilhelmshaven during 1903-4, and continued serving with the fleet. In September 1910 she was sold to Turkey and renamed *Torgut Reis*. The *Kurfürst Friedrich Wilhelm* was also acquired by the Turks and renamed *Heireddin Barbarossa*. With the light cruisers *Hamidieh (Plate 110)* and *Medjidieh* and some good destroyers, these battleships formed the main force of the Turkish fleet until 1914.

The battleships sailed with five destroyers from Beirut on September 28th 1911, ignorant that war between Turkey and Italy was imminent as a result of Italy's intended annexing of Tripoli, then a Turkish possession. On 30th September the squadron was warned and retired into the Dardanelles, the narrow channel linking the eastern Mediterranean with the Sea of Marmora and the Black Sea, and subject of naval blockades, political manoeuvrings and intrigue for generations.

The war ended during September 1912, without the major Turkish ships being called to action. However, only a month later Turkey was at war with Greece, Serbia and Bulgaria, of which only Greece had a useful navy and that did not match the potential strength of the Turkish fleet, having only one modern armoured cruiser and three small old battleships. It was, however, far better organized.

On October 19th the *Torgut Reis* and *Heireddin Barbarossa*, accompanied by the old armoured ship *Messudieh*, the cruiser *Hamidieh* and four torpedo boats, bombarded the Black Sea port of Varna, firing on Bulgarian torpedo boats. Next day the Turks captured two torpedo boats and shelled the military depot at Kavarna. The squadron then moved to the Sea of Marmora to support the Turkish army falling back towards Constantinople before the Bulgarian advance. On November 21st four Bulgarian torpedo boats made a bold attack on Turkish ships off Varna. One torpedo struck the cruiser *Hamidieh*, which reached port with difficulty. The battleships continued to bombard Bulgarian army positions on the coast of the Sea of Marmora until an armistice was signed with Bulgaria and Serbia on 3rd December.

The *Torgut Reis* and other Turkish ships were freed to face the Greeks, who chose to fight on alone. On December 16th a Turkish cruiser and



64 *23 WEISSENBURG, GERMAN 1893*

eight destroyers sortied from the Dardanelles towards the fleet of Greek armoured ships and destroyers patrolling offshore. Shortly afterwards the Turkish flagship *Heireddin Barbarossa* led the *Torgut Reis*, *Messudieh* and *Assar-I-Tewfik* towards the Greek fleet, while the cruiser and destroyers retired within the range of coastal batteries.

The Turkish ships opened fire at 15.000 yards and the Greeks replied when this closed to 8,000 yards. After a five-minute engagement the Turkish ships turned and an hour later the incident ended with the Turks returning to the Dardanelles.

On December 22nd the *Torgut Reis* came out with the cruiser *Medjidieh* and three destroyers but returned on finding the Greek fleet awaiting her.

The *Torgut Reis* and the three other Turkish battleships came out on the morning of January 18th 1913 and steamed for the Greek naval base on the island of Lemnos, followed by the cruiser *Medjidieh* and thirteen destroyers and large torpedo boats. When about twelve miles from the island the Greek cruiser *Averoff* and the three Greek battleships appeared and the Turks turned and steamed for the Dardanelles, fighting a long-range action with the pursuing Greeks, which lasted about two hours. The *Averoff* hit the *Heireddin Barbarossa* several times until both she and the *Torgut Reis* were on fire and each had one barbette damaged by shell hits, but continued to steam and fight until well inside protected waters. They did not emerge after this affair and the war ended in April 1913.

Soon after, the Greeks purchased the old American "pre Dreadnought" battleships *Idaho* and *Mississippi*, and Turkey ordered a battleship to be built in Britain and a battlecruiser to be constructed in Germany.

The *Torgut Reis* and *Heireddin Barbarossa* saw no action during World War I when Turkey was allied to Germany and Austro-Hungary. However, the German battlecruiser *Goeben* and cruiser *Breslau* were acquired by Turkey in 1914 and posed a threat to the Black Sea and Mediterranean naval forces of Britain and her allies.

In 1920 the *Torgut Reis* was relegated to a depot ship with some or all guns removed. However, she was not sold until 1938 and was afterwards scrapped.

Royal Sovereign

BRITISH 1892 *Plate 24*

Built	Royal Naval dockyard, Portsmouth
Laid down	September 1889
Launched	February 1891 (from dock)
Completed	May 1892
Dimensions	*Length waterline* 380ft *Breadth* 75ft *Draught* 27ft 6in mean
Displacement	14,150 tons normal. 15,585 deep-loaded
Machinery	Twin screw Two 3-cylinder vertical triple expansion engines by Humphrys and Tennant Eight cylindrical single-ended boilers IHP natural draught = 9.000 = 15.5 knots IHP forced draught = 13,360 = 18 knots
Bunkers	Coal. 900 tons normal. 1,100/1,490 tons maximum
Endurance	4,720 miles at 10 knots. 2,780 miles at 14 knots
Armament	Four 13.5-inch breech-loading guns. Two forward and two aft barbettes Ten 6-inch quick-firers Sixteen 6-pounder quick-firers Twelve 3-pounder quick-firers Two machine-guns Seven 18-inch diameter torpedo tubes. Two submerged forward. Four above water broadside. One above water in stern. Later reduced to three tubes. Two submerged and one in stern
Armour	*Belt* 18-inch – 16-inch – 14-inch. 250ft long by 8ft 8in wide *Bulkheads* 16-inch – 14-inch *Barbettes* 17-inch – 16-inch – 11-inch *Main deck casemates* 6-inch *Decks* 3-inch – 2½-inch *Side above belt* 4-inch *Screen bulkheads* 3-inch *Forward conning tower* 14-inch *After conning tower* 3-inch
Complement	712

The *Royal Sovereign* gave her name to a class of eight battleships laid down under the Naval Defence Act of 1889. These were the first British battleships with high freeboard to carry all their main guns on the weather deck. They were the first to mount the secondary armament in casemates, to exceed 12,000 tons displacement and to have steel armour.

The class was designed under the direction of Sir William White, a noted naval constructor with a strong personality, who believed in the barbette system of heavy gun mounting. The *Royal Sovereign* carried two pairs of 13.5-inch guns mounted on turntables in pear-shaped armoured barbettes which projected slightly above the weather deck at each end of the superstructure. However, there were no barbette shields, which would have made them vulnerable in action.

The main deck secondary 6-inch guns were in casemates, which were frequently flooded in rough weather. Seven torpedo tubes were origi-

66 *24 ROYAL SOVEREIGN, BRITISH 1892*

nally fitted but these were later reduced to three.

These ships had a symmetry of design and an imposing appearance of well-balanced power which set a new standard of appearance and arrangement for many years.

On trials the *Royal Sovereign* was loaded to a mean draught of 27ft 6in and achieved 13,360 IHP under forced draft to reach 18 knots, making her the fastest battleship of the time. However, other ships of the class were restricted to 11,000 IHP to avoid straining their boilers, and consequently had lower speeds.

The ships were well sub-divided but were found to roll badly and were unsteady gun platforms.

The *Royal Sovereign* first commissioned in May 1892 as flagship of the Channel fleet and was the pride of the British Navy. With her sisters *Repulse, Resolution* and *Empress of India* she formed part of the British squadron under Sir Walter Kerr, attending the opening of the Kiel canal in June 1895. She became a private ship in the Channel fleet during December 1895 and was transferred to the Mediterranean fleet from June 1897 until August 1902. In November 1901 one of her 6-inch guns exploded, killing six and wounding nineteen. She returned home to become portguard ship at Portsmouth from autumn 1902 until May 1905, and refitted there during 1903 when casemates were fitted to the upper-deck 6-inch guns.

The *Royal Sovereign* lay in dockyard reserve at Devonport from May 1905 until February 1907 and then commissioned with a reduced crew. From April 1909 until 1913 she served in the 4th division, Home fleet, being relegated to material reserve during 1913. She was sold in October 1913 for £40,000, a high figure, to be broken up.

A small steam yacht lies alongside the starboard quarter and visitors prepare to leave at the gangway.

Resolution

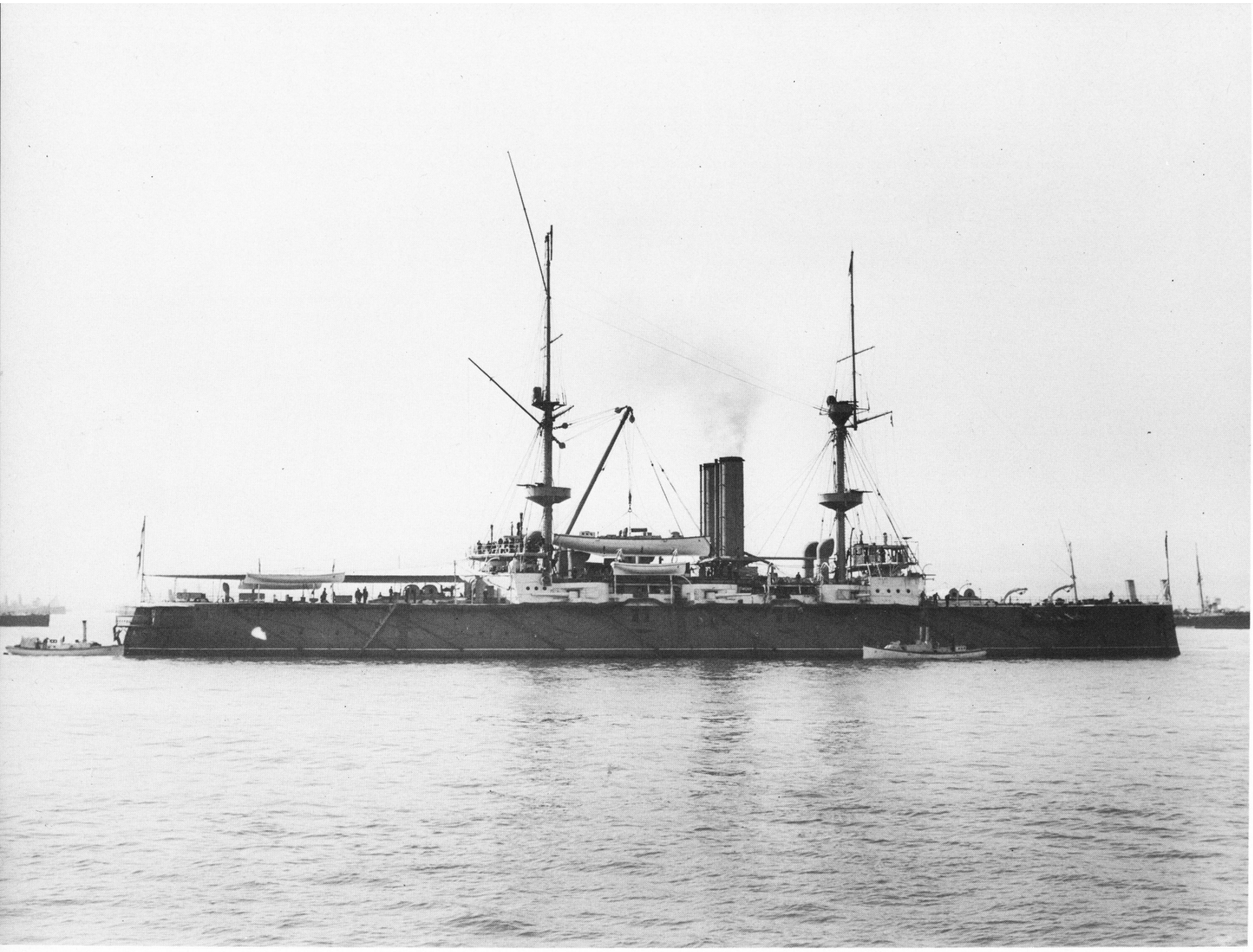
BRITISH 1893 *Plate 25*

Built	Palmers, Jarrow-on-Tyne
Laid down	June 1890
Launched	May 1892
Completed	November 1893
Dimensions	*Length waterline* 380ft
	Breadth 75ft
	Draught 27ft 6in mean
Displacement	14,150 tons normal. 15,585 deep-loaded
Machinery	Twin screw
	Two 3-cylinder vertical triple expansion engines by Palmers
	Eight cylindrical single-ended boilers
	IHP natural draught = 9,000 = 15.5 knots
	IHP forced draught = 11,000 = 16.5 knots
Bunkers	Coal. 900 tons normal. 1,100/1,490 tons maximum
Endurance	4,720 miles at 10 knots. 2,780 miles at 14 knots
Armament	Four 13.5-inch breech-loading guns. Two forward and two aft barbettes
	Ten 6-inch quick-firers
	Sixteen 6-pounder quick-firers
	Twelve 3-pounder quick-firers
	Two machine-guns
	Seven 18-inch diameter torpedo tubes. Two submerged forward. Four above water broadside. One above water in stern. Later reduced to three tubes. Two submerged and one in stern
Armour	*Belt* 18-inch – 16-inch – 14-inch. 250ft long by 8ft 8in wide
	Bulkheads 16-inch – 14-inch
	Barbettes 17-inch – 16-inch – 11-inch
	Main deck casemates 6-inch
	Decks 3-inch – 2½-inch
	Side above belt 4-inch
	Screen bulkheads 3-inch
	Forward conning tower 14-inch
	After conning tower 3-inch
Complement	712

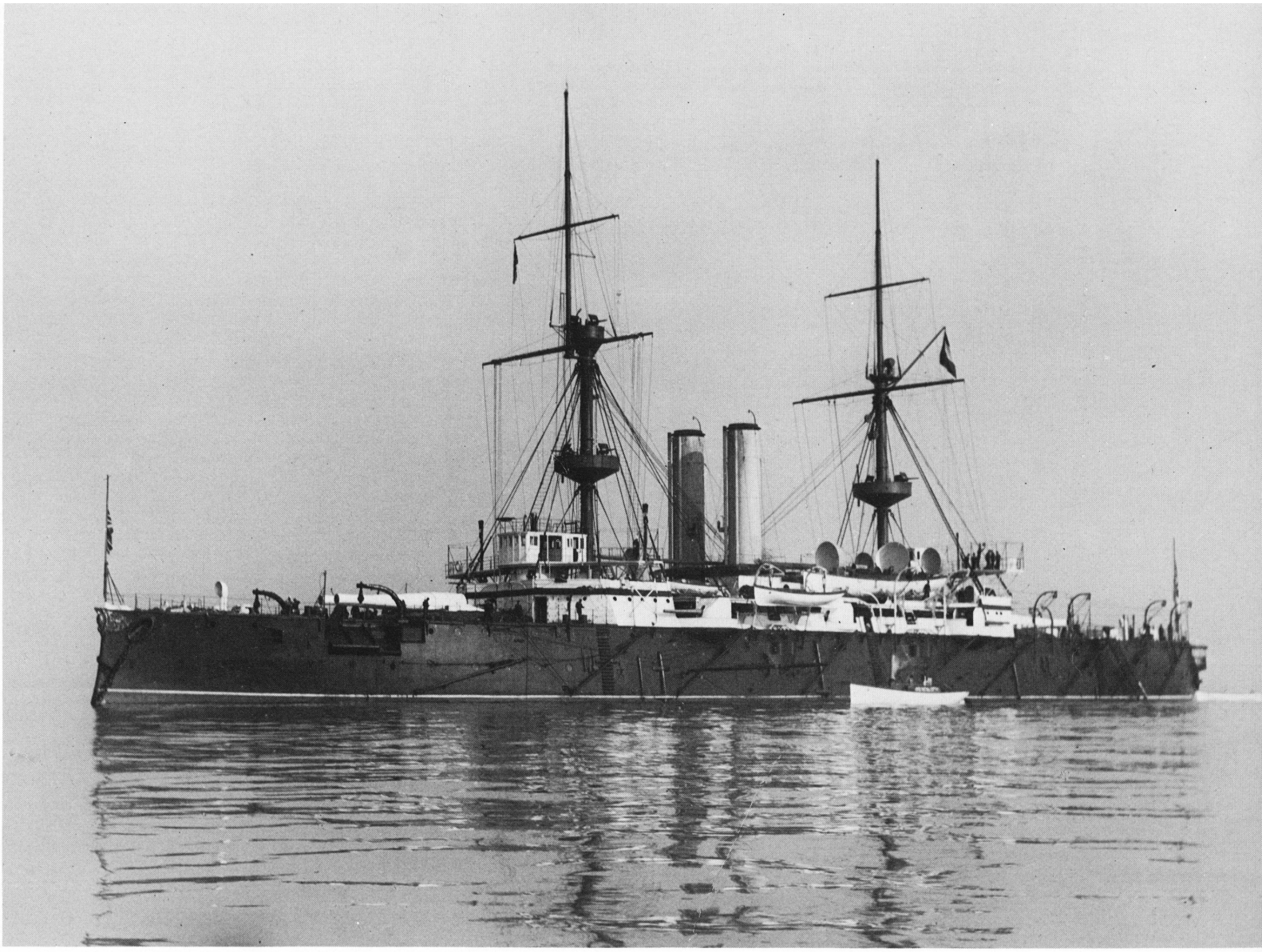
One of the "Royal Sovereign" class, the *Resolution* was first commissioned at Portsmouth in December 1893 for the Channel fleet, with which she served until October 1901. The photograph, taken during this period, clearly shows the breeches of the 13.5-inch guns which are trained away to port. A 56ft steam pinnace capable of carrying 14-inch diameter torpedoes in dropping gear is being hoisted out by the derrick on the mainmast. The sternwalk is visible aft.

During December 1893 the *Resolution* was on passage from Plymouth to Gibraltar in company with the torpedo-gunboat *Gleaner,* when bad weather raised a short, steep sea. The battleship rolled so violently that she had to be put head to sea and eventually was forced to return to Queenstown to coal, while the little *Gleaner* was able to proceed. As a result in 1894 substantial bilge keels were fitted to reduce rolling. In July 1896 the *Resolution* collided with her sister ship *Repulse,* with little damage.

From November 1901 until February 1902 she was coastguard ship at Holyhead, then transferred as second flagship, reserve squadron. She refitted at Devonport during 1902-3 when casemates were installed for the secondary 6-inch guns. In February 1903, when on passage between Holyhead and Plymouth, she lost her rudder and suffered hull and steering gear damage. The *Resolution* commissioned in July 1904 as



68 *25 RESOLUTION, BRITISH 1893*



69 *26 ROYAL OAK, BRITISH 1894*

portguard ship at Sheerness, remaining there until June when she sailed for manoeuvres during July to September. Afterwards she paid off into the fleet reserve and recommissioned in July 1905 in the reserve at Chatham. She was in collision with her sister ship *Ramillies* during July 1906 and afterwards refitted at Chatham. From February 1907 to April 1909 she was at Devonport and then transferred to the 4th division, Home fleet.

Paid off in April 1911, the *Resolution* was towed to the Motherbank anchorage at Spithead and was laid up for sale, suffering damage from collision in March 1912. She was sold in 1914 to be broken up.

Royal Oak

BRITISH 1894 *Plate 26*

Built	Laird, Birkenhead
Laid down	May 1890
Launched	November 1892 (from dock)
Completed	June 1894
Dimensions	*Length waterline* 380ft
	Breadth 75ft
	Draught 27ft 6in mean
Displacement	14,150 tons normal. 15,585 tons deep-loaded
Machinery	Twin screw
	Two 3-cylinder vertical triple expansion engines by Laird
	Eight cylindrical single-ended boilers
	IHP natural draught = 15.5 knots
	IHP forced draught = 11,000 = 16.5 knots
	IHP trials = 11,608 = 18.27 knots (light condition)
Bunkers	Coal. 900 tons normal. 1,100/1,490 tons maximum
Endurance	4,720 miles at 10 knots. 2,780 miles at 14 knots
Armament	Four 13.5-inch breech-loading guns. Two forward and two aft barbettes
	Ten 6-inch quick-firers
	Sixteen 6-pounder quick-firers
	Twelve 3-pounder quick-firers
	Two machine-guns
	Seven 18-inch diameter torpedo tubes. Two submerged forward. Four above water broadside. One above water, stern
Armour	*Belt* 18-inch – 16-inch – 14-inch. 250ft long by 8ft 8in wide
	Bulkheads 16-inch – 14-inch
	Barbettes 17-inch – 16-inch – 11-inch
	Main deck casemates 6-inch
	Decks 3-inch – 2½-inch
	Side above belt 4-inch
	Screen bulkheads 3-inch
	Forward conning tower 14-inch
	After conning tower 3-inch
Complement	712

The *Royal Oak* was another of the "Royal Sovereign" class battleships. She cost £977,996 to build and was placed in reserve at Portsmouth from June 1894 until commissioned in July 1896 for the "particular service" squadron, created at the time of unrest in Europe preceding the South African war.

Beken's camera caught her that summer in the soft light of early morning, lying in Spithead with what became popularly known as the "flying squadron" – the trouble-shooting task force ready to steam anywhere in the world at any time to prove British naval supremacy. The unshielded mountings of the 13.5-inch guns are well shown.

The *Royal Oak* served with the squadron until November 1896, when she refitted at Portsmouth. From March 1897 until June 1902 she served in the Mediterranean fleet, returning to refit at Chatham, when casemates were fitted. During February 1903 she became second flagship, Home fleet, and later served in the Channel until March 1905 when she was transferred to the commissioned reserve at Chatham, where a minor magazine explosion occurred in May. Fire controls were installed during 1907 and in April 1909 she joined the Home fleet at Devonport. In January 1910 the *Royal Oak* became tender to the *Repulse* and passed into dockyard reserve during December 1911. In April 1913 she was towed to the Motherbank anchorage in Spithead and was offered for sale. During 1914 she was bought for £36,450 to be scrapped.

Re Umberto

ITALIAN 1893 *Plate 27*

Built	R.Cantiere di Castellammare di Stabia (Royal Naval Yard)
Laid down	July 1884
Launched	October 1888
Completed	February 1893
Dimensions	*Length overall* 418ft 6in
	Length between perpendiculars 400ft
	Breadth 76ft 9in
	Draught 28ft 6in mean
Displacement	13,893 tons
Machinery	Twin screw
	Four 2-cylinder vertical compound engines by Maudslay,

71 *27 RE UMBERTO, ITALIAN 1893*

	Son and Field, London
	Eighteen cylindrical boilers
	IHP natural draught = 15,700 = 19.3 knots
	IHP forced draught = 19,500 = 20.2 knots
Bunkers	Coal. 1,200 tons normal. Later, plus oil fuel. 3,000 tons maximum
Endurance	6,000 miles at 10 knots
Armament	Four 13.5-inch breech-loading guns. 30 calibre. Two in each barbette, forward and aft
	Eight 5.9-inch quick-firers. 40 calibre
	Sixteen 4.7-inch quick-firers
	Sixteen 6-pounder quick-firers
	Ten 1-pounder quick-firers
	Two machine-guns
	Five 17.7-inch diameter torpedo tubes
Armour	*Belt* 3.9-inch. 239ft long by extending from 3ft below waterline to upper deck
	Bulkheads 2.7-inch
	Barbettes 14.2-inch
	Hoists to barbettes 11.8-inch
	Deck 4.3-inch – 2-inch
	Conning tower 11.8-inch
Complement	752

The *Re Umberto* was one of three almost sister battleships and was the first of the type to be laid down (during 1885), followed by the *Sardegna* and *Sicilia*. They cost an average of £1,050,000 each and were designed under the direction of Engineer Inspector Benedetto Brin. During construction it was decided to add side armour 3.9-in thick.

These ships could be compared with the British "Admiral" type (see the *Camperdown, Plate 13)* but had improved freeboard and carried the main guns much higher. However, the armour protection was comparatively poor. The disposition of three funnels and the single mast was unusual, even for that period. The engine-room was placed between the boiler-rooms.

Four 13.5-inch guns were mounted in pairs, in barbettes forward and aft. These were the first large naval guns to have central pivot mountings and were carried well above the waterline. The hulls had triple-bottom structure and for their time were effective battleships which steamed well and had a tactical turning diameter of about 1,000 yards.

They saw no action until the Italian-Turkish war of 1911-12 and the war service of the *Re Umberto* is described with that of her sister *Sardegna (Plate 28)*. Afterwards the *Re Umberto* was laid up at Genoa and was later used as a depot ship. She was removed from the active list in May 1914 and was towed to La Spezia during June 1915 for use as a depot ship for the new battleship *Andrea Doria*, then completing. During December 1915 she was restored to the active fleet and was converted to a floating battery, serving defensively at the naval base of Brindisi before March 1916 until November 1917, and then until April 1918 as a floating battery at Valona. From April 1918 to October 1918 the *Re Umberto* was at the Taranto naval yard, at first being converted as a troop transport. However, this was abandoned as she was selected to be the attack ship for forcing the principal Austro-Hungarian naval base at Pola. For this service her 13.5-inch guns and barbettes were removed and eight 3-inch guns and many trench mortars were mounted. Special cutting gears were fitted forward for charging and clearing booms and harbour obstacles.

During October 1918 the *Re Umberto* arrived at Venice to prepare for the raid which was intended to open the harbour to about forty MAS motor torpedo boats which would attack the Austro-Hungarian ships inside. However, the war ended before the raid took place.

The *Re Umberto* was discarded by the Italian Navy in January 1920 and was subsequently scrapped.

Sardegna

ITALIAN 1895 *Plate 28*

Built	Royal Naval dockyard, Spezia
Laid down	November 1885
Launched	September 1890
Completed	February 1895
Dimensions	*Length between perpendiculars* 410ft
	Breadth 77ft
	Draught 28ft 6in mean. 29ft 3in maximum
Displacement	13,860 tons, normal. 15,674 tons, full load
Machinery	Twin screw
	Four 3-cylinder triple expansion engines, two on each shaft. Designed by Maudslay, London, built at Naples by Hawthorn, Guppy and Co
	Eighteen cylindrical boilers
	IHP natural draught = 15,200
	IHP forced draught = 22,800
	IHP natural draught trials = 14,190 = 19.06 knots
	IHP forced draught trials = 22,800 = 21.2 knots
Bunkers	Coal. 1,200 tons normal. Plus oil fuel. 3,000 tons maximum
Endurance	6,000 miles at 10 knots
Armament	Four 13.5-inch breech-loading guns. 30 calibre . Two in each barbette, forward and aft
	Eight 5.9-inch quick-firers. 40 calibre
	Sixteen 4.7-inch quick-firers. 40 calibre
	Twenty 6-pounder quick-firers. 43 calibre

73 *28 SARDEGNA, ITALIAN 1895*

	Ten 1 pounders
	Two machine-guns
	Five 17.7-inch diameter torpedo tubes. Two submerged. Three above water
Armour	Steel
	Belt 4⅓-inch amidships. 249ft 3in long by 12ft 6in wide
	Bulkheads at ends of belt 2¾-inch
	Deck 4½-inch
	Lower deck side 4-inch
	Barbettes 14.2-inch
	Hoods to barbettes 1-inch
	Hoists to barbettes 12-inch
	Conning tower 11.8-inch
Complement	752

The *Sardegna* was almost a sister ship to the *Re Umberto (Plate 27)* and *Sicilia*. She saw no action until the outbreak of war between Italy and Turkey on September 29th 1911 over the Italians' treaty right to occupy Tripoli. The *Sardegna* then formed part of the training division, which also included the *Re Umberto* and *Sicilia* and the armoured cruiser *Carlo Alberto (Plate 91)*. These ships, under Rear-Admiral B. Ricci, joined the 1st and 2nd squadrons which comprised the principal force of the Italian fleet.

On September 29th the *Sardegna* sailed from the Italian naval base at Augusta, Sicily, in company with the battleships *Benedetto Brin* and *Re Umberto*, to join the Italian fleet already blockading Tripoli. On October 3rd and 4th she participated with the *Re Umberto* and *Sicilia*, in the bombardment of Tripoli, firing on Fort Sultanieh and Fort "B", while other ships attacked elsewhere.

On October 5th the *Sardegna, Re Umberto* and *Sicilia* anchored off Fort Sultanieh to cover the landing of a naval brigade of 1,732 men, who occupied the fort and then Tripoli itself, while other ships bombarded Fort Hamidieh, which eventually exploded.

On April 10th 1912 the *Sardegna*, with the *Re Umberto, Sicilia*, the cruisers *Carlo Alberto* and *Marco Polo*, the gunboats *Agordat* and *Coatit*, two auxiliary cruisers and six torpedo boats, convoyed transports with 12,000 troops to Zuara, which was bombarded as a feint, before the force was successfully landed at Macabez, western Tripoli, despite a heavy sea.

With the Italian fleet in control of the Mediterranean, action moved to the Aegean. The *Sardegna* remained as part of the central Mediterranean force until the war ended on September 18th 1912.

By 1914 the *Sardegna* and her sisters were relegated to secondary duties but retained armament and still made good speed. Italy declared war on the side of Britain and France in July 1915 and her fleet's main task was to confine the efficient Austro-Hungarian fleet within the Adriatic.

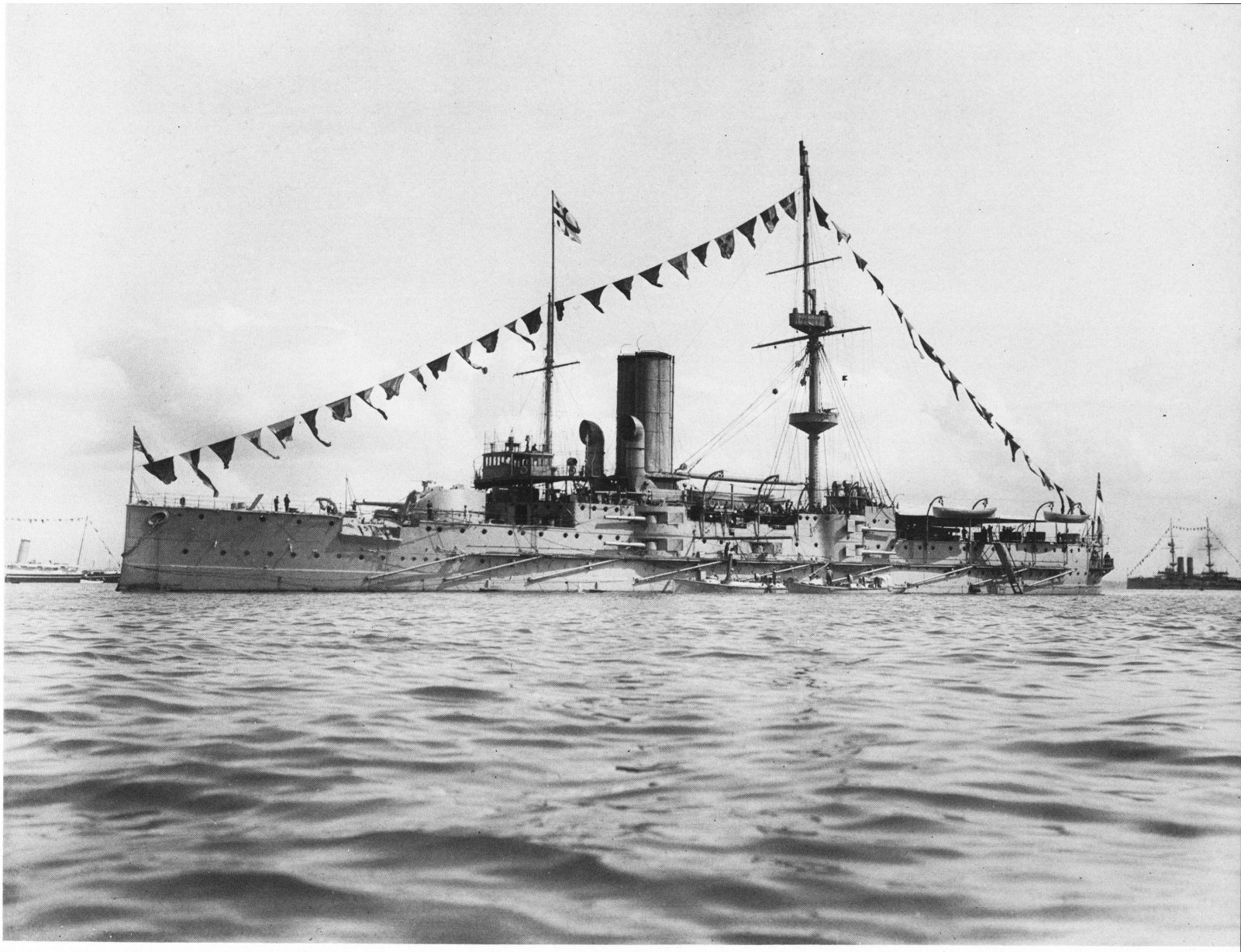
Early in the war the *Sardegna* and the armoured cruiser *Carlo Alberto* covered the seaward flank of an inshore force of torpedo boats and small destroyers supporting Italian troops fighting the Austro-Hungarians on the Isonzo front, at the head of the Adriatic. By 1919 the *Sardegna*'s armament had been reduced to four 13.5-inch guns and four 14-pounder anti-aircraft guns.

On July 4th 1923 the *Sardegna* was discarded by the Italian Navy and was subsequently broken up.

Barfleur

BRITISH 1894 *Plate 29*

Built	Royal Naval dockyard, Chatham
Laid down	October 1890
Launched	August 1892
Completed	June 1894
Dimensions	*Length waterline* 360ft
	Breadth 70ft
	Draught 25ft 6in mean 26ft deep-loaded
Displacement	10,500 tons
Machinery	Twin screw
	Two vertical triple expansion engines by the Greenock Foundry Co
	Cylindrical-type boilers
	IHP natural draught trials = 9,934 = 17.1 knots
	IHP forced draught trials = 13,163 = 18.5 knots
Bunkers	Coal. 750 tons normal. 1,125 tons maximum
Endurance	6,500 miles at 10 knots. 9,750 miles at 10 knots
Armament	*Original*
	Four 10-inch 29-ton guns. 32 calibre. Two forward and two aft
	Ten 4.7-inch quick-firers
	Eight 6-pounder quick-firers
	Twelve 3-pounder quick-firers
	Four smaller
	Torpedo tubes. Two submerged forward. Four above water broadside. One above water in stern
	After refit 1904
	Six 6-inch quick-firers replaced by 4.7-inch
Armour	Compound and steel
	Belt 12-inch 200ft long
	Bulkheads 8-inch
	Side above belt 4-inch
	Barbettes 9-inch
	Barbette shields 6-inch



75 *29 BARFLEUR, BRITISH 1894*

	Deck 2-inch – 2½-inch
	Main deck casemates 4-inch (removed 1902; 1904 reconstruction)
	Casemates fitted during reconstruction 5-inch
	Forward conning tower 12-inch
	Aft conning tower 3-inch
Complement	620
Hull	Wood sheathed and coppered for tropical service

The *Barfleur* and her sister ship *Centurion* were second class battleships designed for the China and Pacific stations, with a draught of 26ft, enabling them to navigate the major Chinese rivers. The restriction on size resulted in a main armament of four 10-inch guns instead of the 13.5-inch and 12-inch of their contemporaries, but this was considered acceptable in view of the 10-inch and 8-inch gun armoured cruisers which the Russian fleet was then stationing in the Far East. The secondary armament was weak but it was envisaged that these two ships would act against ships of a potential enemy with a squadron of cruisers.

The *Barfleur* and *Centurion* resembled the "Royal Sovereign" class in general appearance. They were the first British battleships to have armoured shields over the barbettes to protect the gun crews, who worked above the mounting turntable, but the shields were open at the rear. The 10-inch guns were trained by steam or by hand and had all-round loading positions.

The *Barfleur* cost £533,666 to build and on completion in June 1894 went into reserve at Chatham, but commissioned for manoeuvres during July-September. She sailed for the Mediterranean during February 1895 to relieve the *Sanspareil* and served there until September 1898, being refitted at Malta during 1896-7 and 1897-8. She next served on the China station as rear-admiral's flagship and returned to Devonport in January 1902 to enter fleet reserve. Between August 1902 and July 1904 she was completely reconstructed; the 4.7-inch guns were removed and ten 6-inch substituted, allowing the removal of all superfluous weights.

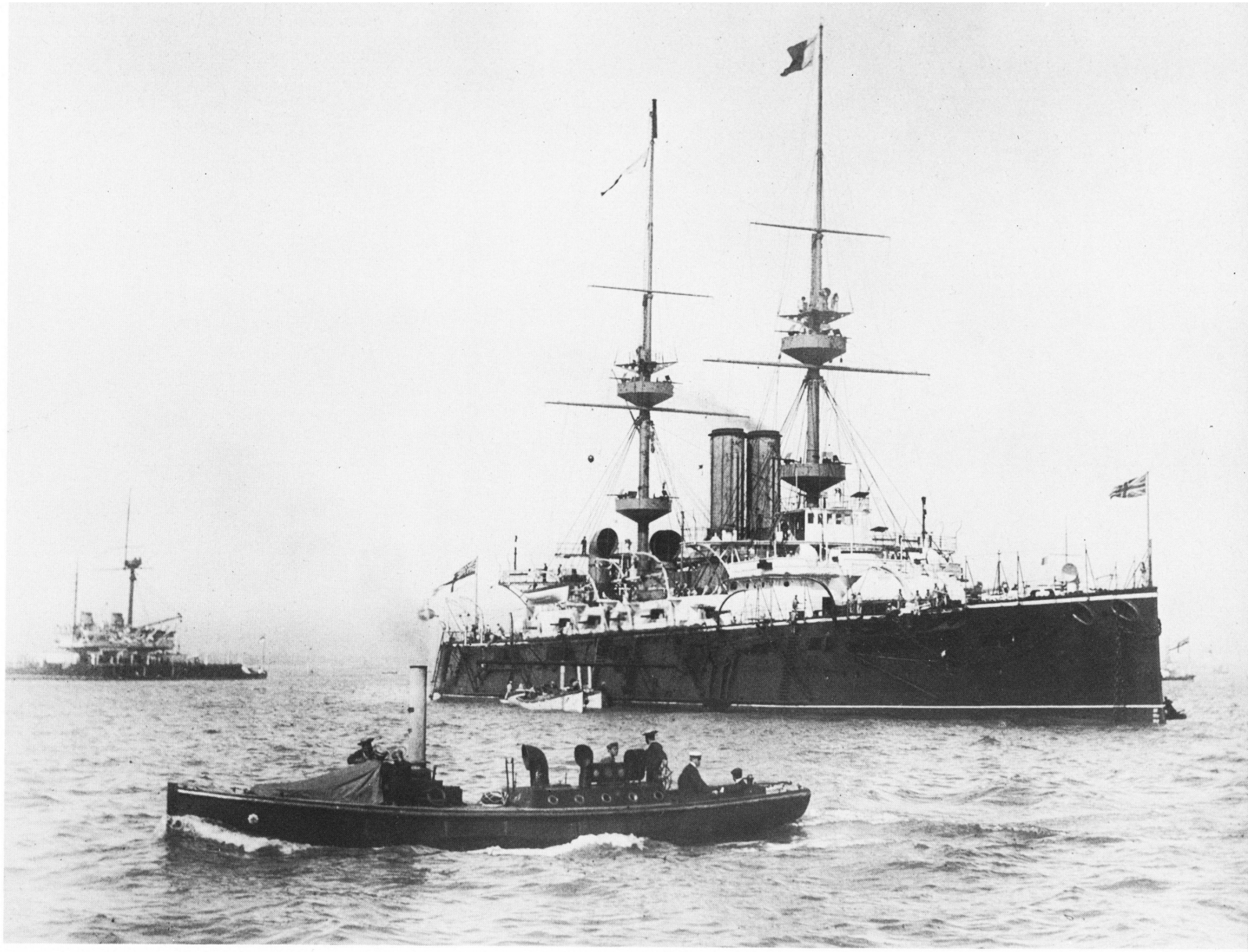
The *Barfleur* commissioned for manoeuvres during July-September 1904, colliding with the battleship *Canopus* in Mount's Bay in August. She rejoined fleet reserve "A" and in January 1905 commissioned in the reserve. During February she sailed for the China station with a relief crew for the battleship *Vengeance*. She became flagship of the Portsmouth reserve from May 1905 and later in the year commenced a refit which continued into 1906. In March 1907 she was reduced to a nucleus crew and in April 1909 joined the 4th division, Home fleet, but during June was ordered to be laid up on the Motherbank. In July 1910 the *Barfleur* was sold for £26,550 to be scrapped.

This photograph was taken in 1905 when the *Barfleur* had completed her extensive reconstruction. She wore the flag of a rear-admiral, probably of the Portsmouth reserve. The secondary armament of ten 6-inch guns was mounted in a new system of casemates, the after bridge was removed and the foremast was reduced to a signal mast. Windsails were used in place of the number of prominent ventilator cowls abaft the funnels, as built. The *Barfleur* was by then painted the uniform grey introduced into the Royal Navy during 1903.

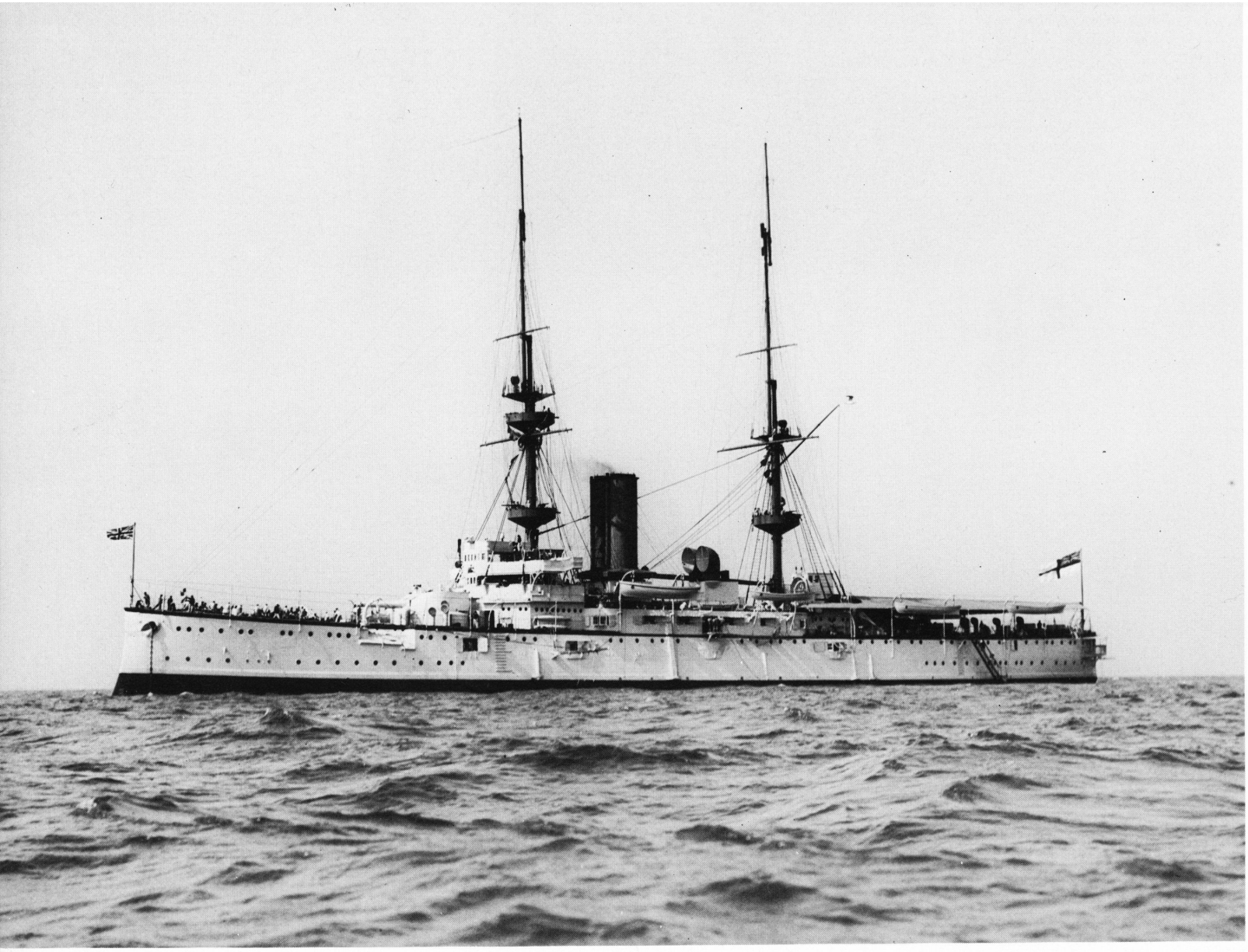
Renown

BRITISH 1897 *Plates 30 and 31*

Built	Royal Naval dockyard, Pembroke
Laid down	February 1893
Launched	May 1895
Completed	January 1897
Dimensions	*Length* 380ft
	Breadth 72ft 4in
	Draught 26ft 9in mean
Displacement	12,350 tons
Machinery	Twin screw
	Two vertical triple expansion engines by Maudslay, Son and Field
	Eight cylindrical boilers
	IHP trials 8 hours natural draught = 10,708 = 17.9 knots
	IHP trials 4 hours forced draught = 12.901 = 19.75 knots
Bunkers	Coal. 800 tons normal. 1,760 tons maximum
Endurance	8,500 miles at 15 knots
Armament	Four 10-inch. 40 calibre. Two forward and two aft in turrets
	Ten 6-inch quick-firers
	Twelve 12-pounder quick-firers
	Twelve 3-pounder quick-firers
	Five 18-inch diameter torpedo tubes. Four submerged. One above water in stern
Armour	Harvey steel
	Belt 8-inch – 6-inch. 200ft long
	Bulkheads 10-inch – 6-inch
	Barbettes 10-inch
	Barbette shields 6-inch
	Main deck casemates 4-inch
	Upper deck casemates 4-inch
	Lower deck sides 6-inch
	Deck 3-inch
	Forward conning tower 9-inch
	Aft conning tower 3-inch
Complement	674
Hull	Wood sheathed and coppered for tropical service



77 *30 RENOWN, BRITISH 1897*



78 *31 RENOWN, BRITISH 1897*

The *Renown* was the only armoured ship ordered under the 1892-3 estimates of a Liberal government. She was an improvement on the "Barfleur" type, with a thinner but more effective belt of Harvey steel armour. In place of the usual flat deck above the belt, a sloping deck behind it was fitted and this innovation became used in subsequent British ships and those of other navies. The theory was that at whatever angle the belt might be hit and penetrated, the projectile then met further armour inclined at 45 degrees, which should deflect it. She was the first British ship to carry all secondary guns in casemates and was to have been the first of a class to mount 12-inch guns, but as these were not available, she was given similar armament to the earlier *Barfleur* and *Centurion,* making her a second class battleship – the last to be built for Britain. However, she was an important ship and set trends for many subsequent ones. Her appearance was admired throughout the fleet.

The *Renown* was four and a half years under construction and cost £746,247. She was completed at Devonport dockyard and passed into reserve in January 1897. In June she commissioned as flagship for the Jubilee naval review at Spithead, and *Plate 30* shows her here, with the old battleship *Thunderer* in the background. She afterwards sailed as flagship of the North American and West Indies station under Vice-Admiral Sir John Fisher. When he was transferred to the Mediterranean in 1899, the *Renown* was transferred with him, remaining there as flagship until February 1902. On return to England she was refitted to convey the Duke and Duchess of Connaught on their visit to India, and the main deck 6-inch guns were removed to provide increased accommodation and to reduce weight.

She returned to pass into fleet reserve at Portsmouth until July 1904, when she commissioned for naval manoeuvres. During 1904-5 she underwent major refitting and was commissioned in the reserve in February 1905. She was then prepared to act as a royal yacht to take the Prince and Princess of Wales (later King George V and Queen Mary) on a state visit to India during April to October 1905, and all 6-inch guns were removed. She was repainted with a white hull and was referred to as "the battleship yacht". She is shown in *Plate 31* getting up anchor at this time.

She commissioned in the reserve during May 1906 and joined the 4th division, Home fleet in 1907. Although outdated, she could still steam at 17.4 knots and with 12-inch guns would have been a useful ship. However, the *Renown* was relegated as tender to HMS *Victory* in October 1909 and later became a training ship for stokers at Portsmouth. She was placed under care and maintenance in January 1913 and laid up on the Motherbank in Spithead, and was sold during 1914 for breaking up.

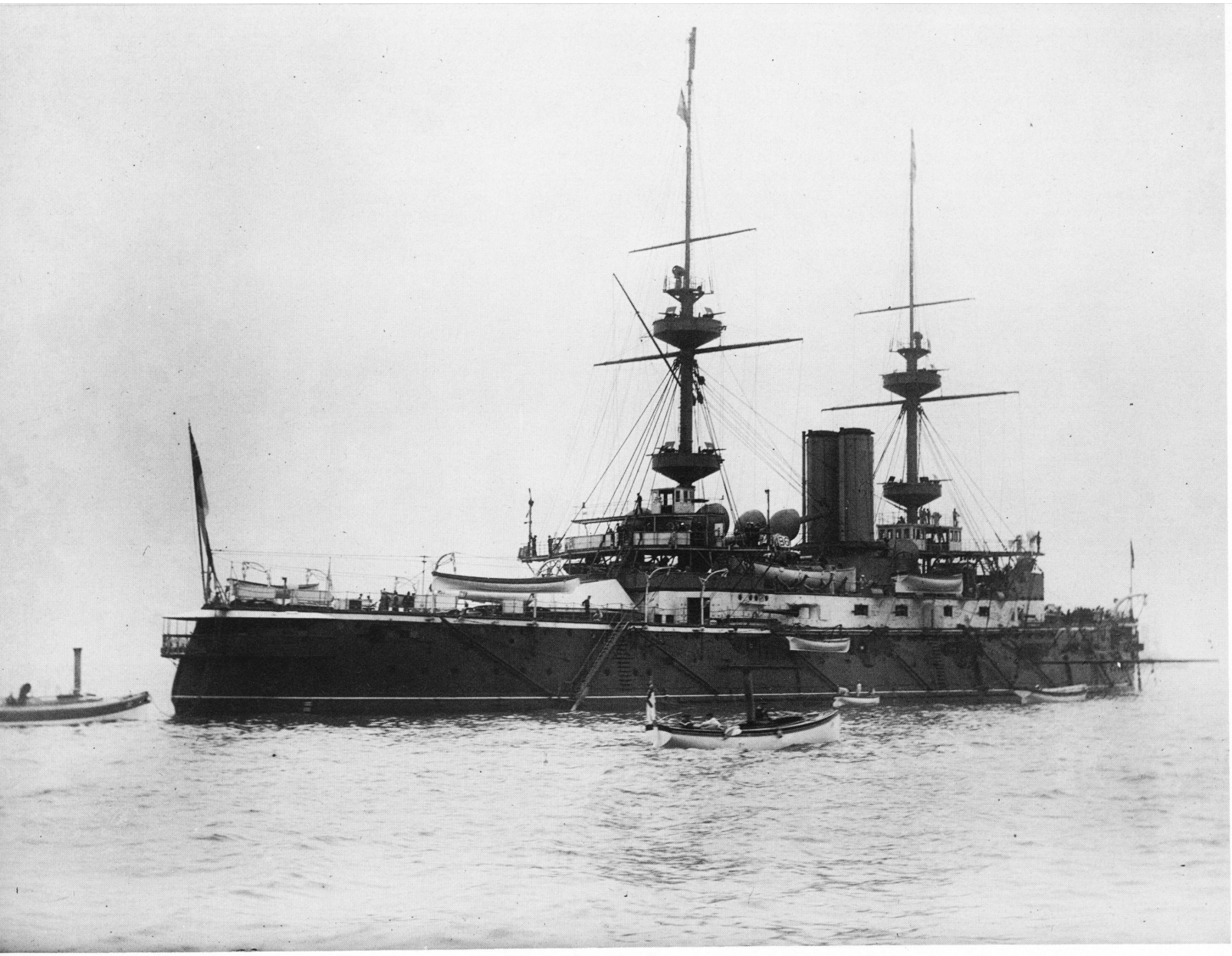
Majestic

BRITISH 1895 *Plates 32 and 33*

Built	Royal Naval dockyard, Portsmouth
Laid down	February 1894
Launched	January 1895 (from dock)
Completed	December 1895
Dimensions	*Length overall* 413ft
	Length 390ft
	Breadth 75ft
	Draught 27ft 6in mean
Displacement	14,900 tons
Machinery	Twin screw
	Two 3-cylinder inverted triple expansion engines by the Naval Construction and Armaments Co
	Eight cylindrical boilers single-ended
	IHP trials 8 hours natural draught = 10,418 = 16.9 knots
	IHP trials 4 hours forced draught = 12,097 = 17.9 knots
Bunkers	Coal. 900 tons normal. 1,900 tons maximum. Plus 400 tons oil fuel added later
Endurance	3,500/7,600 miles at 10 knots. 1,700/4,000 miles at 15 knots
Armament	Four 12-inch 46-ton guns. 35 calibre. Two forward and two aft
	Twelve 6-inch quick-firers. 40 calibre
	Sixteen 12-pounder quick-firers
	Twelve 3-pounder quick-firers
	18-inch diameter torpedo tubes. Four submerged. One above water in stern
Armour	Harvey steel
	Belt 9-inch amidships. 220ft long by 16ft wide
	Bulkheads 14-inch forward. 12-inch aft
	Barbettes 14-inch
	Barbette shields 10-inch
	Casemates 6-inch
	Decks 4-inch – 3-inch – 2½-inch
	Conning tower forward 14-inch
	Conning tower aft 3-inch
Complement	672

The "Majestic" class battleships were ordered by a reluctant government in response to agitation for the need to maintain British naval supremacy over the navies of France and Russia, then considered the likeliest enemies.

Nine ships were laid down between 1893 and 1895, including the *Majestic, Magnificent, Hannibal, Prince George, Victorious, Jupiter, Mars, Caesar,* and *Illustrious.* They were essentially similar to the successful



80 *32 MAJESTIC, BRITISH 1895*

81 *33 MAJESTIC, BRITISH 1895*

Renown (Plate 31) but mounted four 12-inch guns in place of her 10-inch. The "Majestics" also had increased secondary armament, heavier armour, and were 10ft longer.

The *Majestic* and *Magnificent* were the first of the class to commission and were built in record time thanks to rivalry between the two dockyards – Portsmouth, where the *Majestic* was built, and Chatham, where the *Magnificent* was laid down.

The 12-inch guns superseded the 13.5-inch of the earlier "Royal Sovereign" ships and the "Majestics' " turrets had improved shell-handling arrangements and were hydraulically operated. However, eight of the twelve 6-inch secondary guns were mounted in main-deck casemates, which were of limited use in a seaway.

The concentration of protective armour over the central "citadel" in these battleships followed that of many preceding types. Beyond this, the hull was almost unprotected and an embarrassing damage occurred at Malta where the *Illustrious* was accidentally rammed by a steam picket boat which burst throught her stern plating.

The "Majestic" class were successful ships, steady gun platforms and could turn in a circle of 450 yards diameter at 15 knots speed. Not least, they were of imposing appearance; important for prestige and for the satisfaction of the British public whose money had been spent on these formidable-looking ships.

The *Majestic* cost £916,382 to build and commissioned at Portsmouth in December 1895 as flagship of the Channel fleet, where she served until February 1904; a remarkably long commission. These photographs were taken during this period *(Plates 32 and 33)*. She paid off at Portsmouth and in July again commissioned in the Channel fleet. During December an explosion of coal gas in a bunker killed one man and injured two others. She transferred to the Atlantic fleet in August 1906 and commissioned in the reserve during October, joining the Home fleet at the Nore in February 1907. The *Majestic* refitted at Chatham during 1907-8 when fire control and wireless transmitting equipment were fitted.

During January 1908 she was with the Devonport division of the Home fleet but between February to June was temporarily attached to the Nore division of the Home fleet. She rejoined the Devonport division, Home fleet, between June 1908 and August 1909, with a nucleus crew, and from August 1910 until May 1912 acted as a parent ship for battleships. Afterwards she joined the 3rd fleet at Devonport and during July 1912 collided with the battleship *Victorious,* without sustaining damage. Later she formed part of the 4th division at Devonport until August 1914, when she commissioned there with the 7th battle squadron for war service. During October she escorted a convoy of Canadian troops bound for France and afterwards operated in the Channel on patrol duty and bombarded the Belgian coast with the Dover patrol.

In 1915 the *Majestic* was equipped with bow gear for "mine bumping" in the Dardanelles operations and also participated in the bombardments there.

She became the flagship of Admiral Nicholson on 26th May and was sunk next day off Gaba Tepe by the German *U 21.* The *Majestic* was anchored with torpedo nets out, surrounded by transports discharging stores and equipment and protected by patrolling destroyers and trawlers. Nevertheless, the submarine penetrated the screen and fired two torpedoes which sliced through the nets. Forty of her crew were killed or drowned but excellent discipline saved the remainder. She capsized in 9 fathoms and rested upside down on her masts until a gale at the end of the year collapsed the foremast and she disappeared.

Magnificent

BRITISH 1895 *Plate 34*

Built	Royal Naval dockyard, Chatham
Laid down	December 1893
Launched	December 1894 (from dock)
Completed	December 1895
Dimensions	*Length overall* 413ft
	Length 390ft
	Breadth 75ft
	Draught 27ft 6in mean
Displacement	14,900 tons
Machinery	Twin screw
	Two 3 cylinder inverted triple expansion engines by Penn
	Eight cylindrical boilers single-ended
	IHP trials 8 hours natural draught = 10,301 = 16.5 knots
	IHP trials 4 hours forced draught = 12,157 = 17.6 knots
Bunkers	Coal. 900 tons normal. 1,900 tons maximum. Plus 400 tons oil fuel added later
Endurance	3,500/7,600 miles at 10 knots. 1,700/4,000 miles at 15 knots
Armament	Four 12-inch 46-ton guns. 35 calibre. Two forward and two aft
	Twelve 6-inch quick-firers. 40 calibre
	Sixteen 12-pounder quick-firers
	Twelve 3-pounder quick-firers
	18-inch diameter torpedo tubes. Four submerged. One above water in stern
Armour	Harvey steel
	Belt 9-inch amidships. 220ft long by 16ft wide
	Bulkheads 14-inch forward and 12-inch aft
	Barbettes 14-inch
	Barbette shields 10-inch
	Casemates 6-inch
	Decks 4-inch – 3-inch – 2½-inch

83 *34 MAGNIFICENT, BRITISH 1895*

Conning tower forward 14-inch
Conning tower aft 3-inch
Complement 672

The *Magnificent* cost £909,789 to build and commissioned at Chatham in December 1895 as second flagship of the Channel fleet, serving as such until February 1904, when she paid off for refitting at Devonport. This photograph was taken about 1897 and shows the casemate guns of the 6-inch secondary armament trained on the broadside, illustrating how difficult it was to work the main-deck guns in a seaway. The white painted canvas dodgers rigged around the guardwires gave the effect of bulwarks.

The *Magnificent* commissioned in July 1904 with the Channel fleet and during December transferred to the Atlantic fleet. In June 1905 one of her guns exploded on firing, causing eighteen casualties. In November 1906 she commissioned in the reserve at Chatham and transferred to the Home fleet at the Nore in February 1907. She was temporarily flagship of the commander-in-chief during November and refitted during 1907-8 when oil-fuel burning and fire control equipment was fitted. She became second flagship, Home fleet, from August 1908 until January 1909 and during February became flagship of the Nore division of the Home fleet with a nucleus crew. During 1910 the *Magnificent* became flagship of the vice-admiral, Home fleet, 3rd and 4th divisions, and in February 1911 was transferred as tender to HMS *Vivid*, as turret drill ship. In May 1912 she was sent to Devonport as a seagoing gunnery training ship but again became an independent command in September 1912. In June 1913 she grounded, with slight damage, off Cawsand and the following month joined the 3rd fleet at Devonport.

In August 1914 the *Magnificent* commissioned for service with the 9th battle squadron, based on the Humber, but was transferred to Scapa Flow defence. During 1915 her 12-inch guns and turrets were removed, as were those of the *Mars*, *Illustrious* and *Victorious*. The guns were re-mounted in the new monitors of the "Lord Clive" type, vitally needed to bombard the Belgian coast and for similar shallow water duties where big-gun range was required but battleships were unable to float.

The *Magnificent* was converted to a troopship for Mediterranean service by September 1915 when she took part in the Sulva landing. Afterwards she was relegated to secondary duties and became an ammunition store at Rosyth until 1919, being sold in 1921 to be broken up at Inverkeithing.

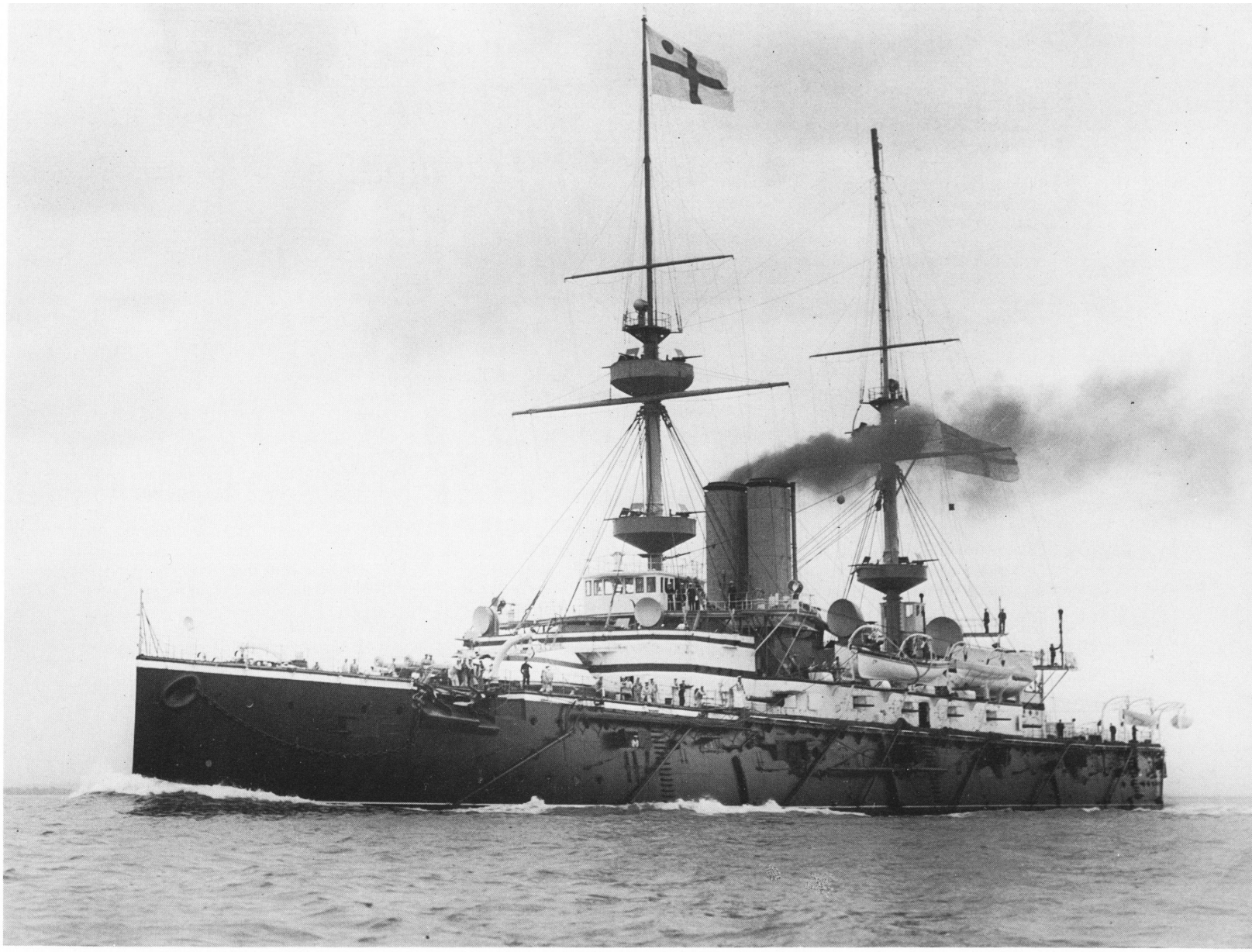
Caesar

BRITISH 1898 *Plate 35*

Built	Royal Naval dockyard, Portsmouth
Laid down	March 1895
Launched	September 1896
Completed	January 1898
Dimensions	*Length overall* 413ft
	Length between perpendiculars 390ft
	Breadth 75ft
	Draught 27ft 6in mean
Displacement	14,560 tons 15,730 fully loaded
Machinery	Twin screw
	Two 3-cylinder inverted triple expansion engines by Maudslay, Son and Field
	Eight cylindrical boilers
	IHP trials 8 hours natural draught = 10,630 = 16.7 knots
	IHP trials 4 hours forced draught = 12,652 = 18.7 knots
Bunkers	Coal. 900 tons normal. 1,900 tons 2,200 tons. Later also oil fuel
Endurance	3,500 miles at 10 knots. 7,600 miles at 10 knots
Armament	Four 12-inch 46-ton wire-wound guns. 35 calibre. 860-pound weight projectile. Two forward and two aft
	Twelve 6-inch quick-firers. 40 calibre. In casemates
	Sixteen 12-pounder quick-firers
	Twelve 3-pounder quick-firers
	Two maxims
	Five 18-inch diameter torpedo tubes. Four submerged. One above water in stern
Armour	Harvey
	Belt 9-inch. 220ft long by 16ft wide
	Bulkheads 14-inch – 12-inch
	Barbettes 14-inch
	Barbette shields 10-inch
	Casemates 6-inch
	Decks 4-inch – 3-inch – 2½-inch
	Conning towers 14-inch – 3-inch
Complement	672 (later 757)

The *Caesar*, another of the "Majestic" class battleships, cost £872,474 to build. She had an active career and first commissioned at Portsmouth in January 1898 for the Mediterranean, but was temporarily attached to the Channel fleet and did not arrive at Malta until May. She remained in the Mediterranean until October 1903 and was refitted at Malta during 1900-1.

Returning to Portsmouth for further refitting, she commissioned in



85 *35 CAESAR, BRITISH 1898*

February 1904 as flagship of the vice-admiral, Channel fleet, joined the Atlantic fleet in December and in March 1905 became flagship of the rear-admiral, Channel fleet. In June she ran down the barque *Afghanistan* off Dungeness, suffered damage and was repaired at Devonport, afterwards resuming her flagship duties. In February 1907 the *Caesar* temporarily became flagship of the Atlantic fleet and in May joined the Devonport-based division of the Home fleet. Fire controls were fitted to her at various times between 1905-7 and she refitted at Devonport during 1907-8. In May 1909 she joined the Nore division of the Home fleet and in May-June became temporarily the flagship of the vice-admiral, 3rd and 4th divisions, Home fleet. By April 1911 she was a unit of the Devonport 3rd division, Home fleet, and in March 1912 was in the 4th division with a nucleus crew. After May 1912 she was in the 3rd and later 4th divisions, Home fleet.

In 1914 the *Caesar* was commissioned at the outbreak of war in the 7th battle squadron for service in the Channel and with the Southern fleet. During 1915-18 she served on the North American and West Indies station and in the Atlantic. In 1918-19 the *Caesar* was transferred to the Mediterranean and later to the Black Sea. She was sold in 1921 to be broken up in Germany.

This photograph, perhaps more than any other in this book, typifies the power and pomp of the Victorian Navy. It shows the *Caesar* steaming at about 14 knots and wearing the flag of vice-admiral of the Channel fleet in 1903 or early 1904.

By then communications at sea were becoming more important as fleet speeds increased and manoeuvres became more complicated. As well as flags, major warships were by now using searchlight and semaphore for signalling. The *Caesar* had searchlights mounted on each wing of the forward bridge and semaphores on the wings of the after bridge, with another at the head of the main topmast. Searchlights for scanning were fitted at each lower masthead.

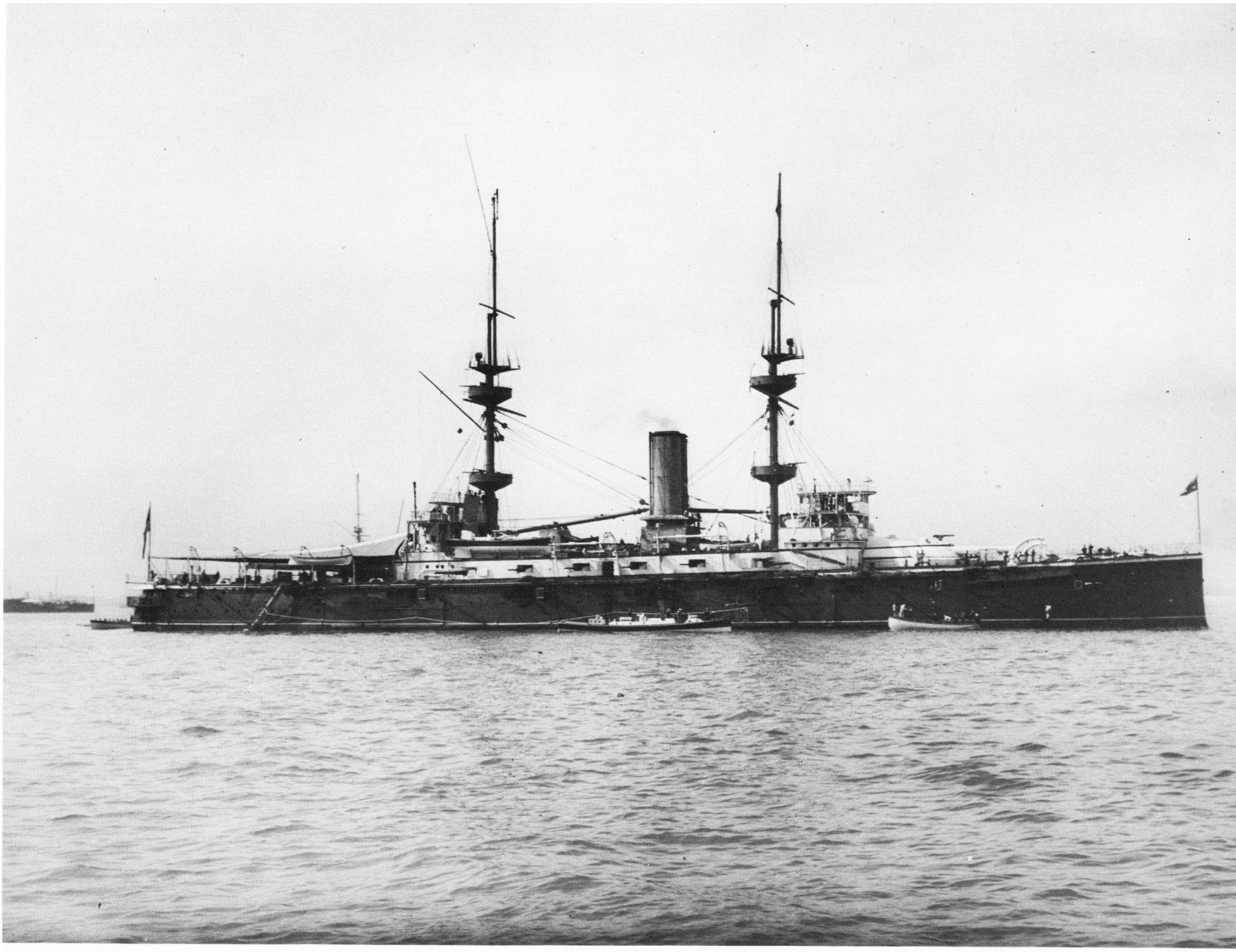
The torpedo net booms were prominent on her sides. Torpedo nets were carried by British battleships for many years and when the "Majestic" class were built the technique of their use in forming a steel mesh curtain around a warship while at anchor or steaming slowly was still developing, though other navies regarded nets as of doubtful value and the American fleet never adopted them. "Out nets" became an important evolution in the British fleet and some of the "Majestic" class had a net shelf fitted at main deck level instead of at the upper deck, reducing time for swinging out nets to ten seconds and stowing them to one minute; excellent performances in view of the weight and bulk of the nets. They were suspended from 30ft long steel tubular booms which stowed diagonally along the ship's side, as in this photograph. When lowered the nets formed a curtain about 25ft deep and a ship could steam at about 6 knots, protected against torpedo attack at sea. However, the net-penetrating torpedo made the nets largely obsolete though they were retained in the British fleet until World War I when they were principally used for protection at anchor.

Hannibal

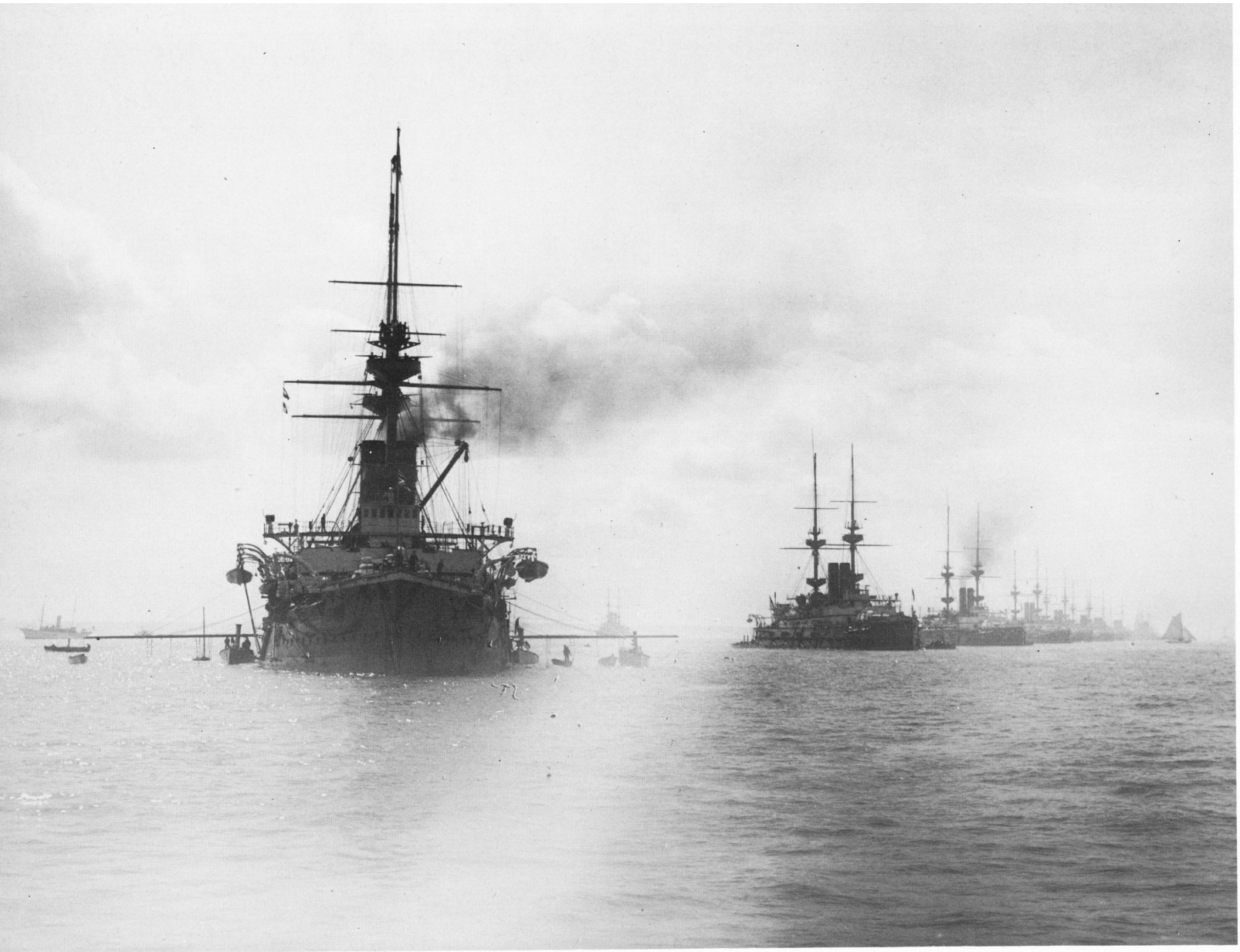
BRITISH 1898 *Plate 36*

Built	Royal Naval dockyard, Pembroke
Laid down	May 1894
Launched	April 1896
Completed	April 1898
Dimensions	*Length overall* 413ft
	Length 390ft
	Breadth 75ft
	Draught 27ft 6in
Displacement	14,900 tons
Machinery	Twin screw
	Two 3-cylinder inverted triple expansion engines by Harland and Wolff
	Eight cylindrical boilers. Single-ended
	IHP trials 8 hours natural draught = 10,357 = 16.3 knots
	IHP trials 4 hours forced draught = 12,253 = 18 knots
Bunkers	Coal. 900 tons normal. 1,900 tons maximum. Plus 400 tons oil fuel added later
Endurance	3,500/7,600 miles at 10 knots. 1,700/4000 miles at 15 knots
Armament	Four 12-inch 46-ton guns. 35 calibre. Two forward and two aft
	Twelve 6-inch quick-firers. 40 calibre
	Sixteen 12-pounder quick-firers
	Twelve 3-pounder quick-firers
	18-inch diameter torpedo tubes. Four submerged. One above water in stern
Armour	Harvey steel
	Belt 9-inch amidships. 220ft long by 16ft wide
	Bulkheads 14-inch forward and 12-inch aft
	Barbettes 14-inch
	Barbette shields 10-inch
	Casemates 6-inch
	Decks 4-inch – 3-inch – 2½-inch
	Conning tower forward 14-inch
	Conning tower aft 3-inch
Complement	672

The *Hannibal* cost £906,799 to build. Her completion was delayed by strikes and labour unrest. She first commissioned at Portsmouth in April 1898, to go into fleet reserve. In May she commissioned for the Channel



87 *36 HANNIBAL, BRITISH 1898*



88 *37 BATTLESHIPS AT THE CORONATION NAVAL REVIEW SPITHEAD, 1902*

fleet. This photograph was taken in 1902 and shows boat activity around the anchored *Hannibal*. Like most contemporary British battleships, the "Majestic" class carried 14-inch diameter torpedoes to be used by the two steam picket boats which were carried on board. These were equipped with dropping gear. There was no intention to use them at sea but they were considered as potentially useful when patrolling the anchored parent ship against enemy attack, in a sortie against an enemy ship or port, or possibly during inshore blockade duties.

In October 1903 the *Hannibal* collided with her sister ship the *Prince George*, without sustaining damage. During December 1904 she transferred to the Atlantic fleet but returned to the Channel fleet in February 1905 and paid off at Devonport in August. She refitted between June and November 1906, receiving oil burning equipment and fire controls, and was recommissioned during October in the reserve. Oil-fuel burning equipment was first fitted to a large ship in the *Mars*, but it produced a lot of smoke, annoying her boiler-room staff who were rightly jealous of their reputation a efficient stokers. The *Hannibal* was the most economical steamer of her class so far as oil consumption was concerned.

From January to June 1907 the *Hannibal* served with the Channel fleet and transferred to the Devonport division, Home fleet, in July, serving there until 1914. In August 1909 she struck rocks off Babbacombe, Devon, and was seriously damaged. During October she collided with Torpedo Boat *105* but sustained no damage. She became temporary guard ship at Devonport in June 1910 and refitted there from November 1911 until March 1912. When war commenced in August 1914 it was intended she should join the 9th battle squadron, but she was ordered to the Humber river, on the east coast, as guard ship, later proceeding to Scapa Flow defence.

In September 1915 the four 12-inch guns and their turrets were removed from the *Hannibal* for installation in new monitors being built for bombardment work, and she was converted to a troopship, serving in the Mediterranean until 1916. Afterwards she carried troops to the East Indies and to Egypt. The *Hannibal* was sold in 1920 to be broken up in Italy.

Battleships at the Coronation Naval Review, Spithead, 1902

Plate 37

Six "Majestic" class battleships lying in line. Ships in review generally anchored two cables (400 yards) apart and precision of anchoring was important where scores of large vessels would be brought up in a confined area.

Despite efficient stoking, the smoke haze from the numbers of coal fired ships was inevitable and here emphasised the sun glitter on a Spithead alive with sailing and steam yachts. Crews are busy with ships' boats at the booms and the scene colourful with the varied liveries of an international gathering of warships paying respect to the newly crowned King Edward VII.

Fuji

JAPANESE 1897 *Plate 38*

Built	Thames Ironworks, Poplar, London
Laid down	August 1894
Launched	March 1896
Completed	August 1897
Dimensions	*Length overall* 412ft
	Length waterline 390ft
	Breadth 73ft
	Draught 26ft 6in
Displacement	12,533 tons normal
Machinery	Twin screw
	Two 4-cylinder reciprocating triple expansion engines by Humphrys and Tennant
	Ten cylindrical boilers
	IHP trials natural draught = 10,200 = 16.8 knots
	IHP trials forced draught = 14,100 = 18 knots
Bunkers	Coal. 700 tons normal. 1,300 tons maximum
Armament	Four 12-inch Elswick guns. 40 calibre. Two forward and two aft
	Ten 6-inch quick-firers. 40 calibre
	Twenty 3-pounders
	Four 2½-pounders
	Five 18-inch torpedo tubes. One above water bow. Four submerged broadside
Armour	*Main belt* 18-inch – 14-inch
	Bulkheads 14-inch
	12-inch gun shields 6-inch
	Barbettes 14-inch upper. 9-inch lower
	Casemates 6-inch face. 2-inch rear
	Deck 2½-inch over belt
Complement	600

In 1892 the Japanese were on the verge of war with China but had few armoured ships, so the naval programme for that year included the sister battleships *Fuji* and *Yashima*, to counter the two German built battleships in the Chinese fleet. However, the war ended before these ships

90 *38 FUJI, JAPANESE 1897*

were built.

The *Fuji* and *Yashima* were constructed in Britain to designs by G.C. Macrow, naval architect of the Thames Ironworks and still remembered by generations of shipbuilders for his invaluable technical pocket book for the industry. These ships were an improvement on the "Royal Sovereign" design but were armed with 12-inch instead of 13.5-inch guns and had improved armour protection of the barbettes. The 12-inch guns were a new Elswick pattern which proved equally effective as the larger weapon, could fire an 850-pound shell every 80 seconds with end-on loading, and could be trained through 240 degrees. However, only four of the secondary 6-inch guns were in casemates, the others being mounted on the upper deck, foreshadowing the re-positioning of such guns in British battleships during World War I to avoid casemates being flooded at sea and rendering the guns ineffective. The 2½-pounder guns then regarded as anti-torpedo boat armament were mounted on the shelter deck.

During 1901 the ships were refitted and the 2½-pounders replaced by sixteen 12-pounder guns, though four 3-pounders were retained in the fighting tops, which were removed during a refit in Japan in 1905.

At the outbreak of the Russo-Japanese war in 1904 the *Fuji* was one of six battleships in the 1st division of the 1st squadron of the fleet and was active throughout. On February 9th 1904 she was in a fleet action against Russian warships off their base at Port Arthur, particularly engaging the cruiser *Bayan* and suffering damage and casualties. On March 22nd 1904 she and the battleship *Yashima* bombarded the base with their big guns and later participated in the inconclusive actions off the coast.

On August 10th Russian warships sailed from Port Arthur and were engaged by a Japanese force including the *Fuji*, which concentrated her fire on the battleship *Tsarevitch*.

At the decisive battle of Tsushima, which destroyed the Russian 2nd Pacific squadron, the *Fuji* fired a last 12-inch shell as the Japanese fleet turned away in the evening and this exploded the magazines of the Russian battleship *Borodino*, which capsized and sank with loss of all but one of her crew. The *Fuji* suffered few casualties and little damage in this bitter battle.

In 1910 she was reclassified as a coast defence ship. New "Miyabara" type water tube boilers were installed and her funnels were lowered.

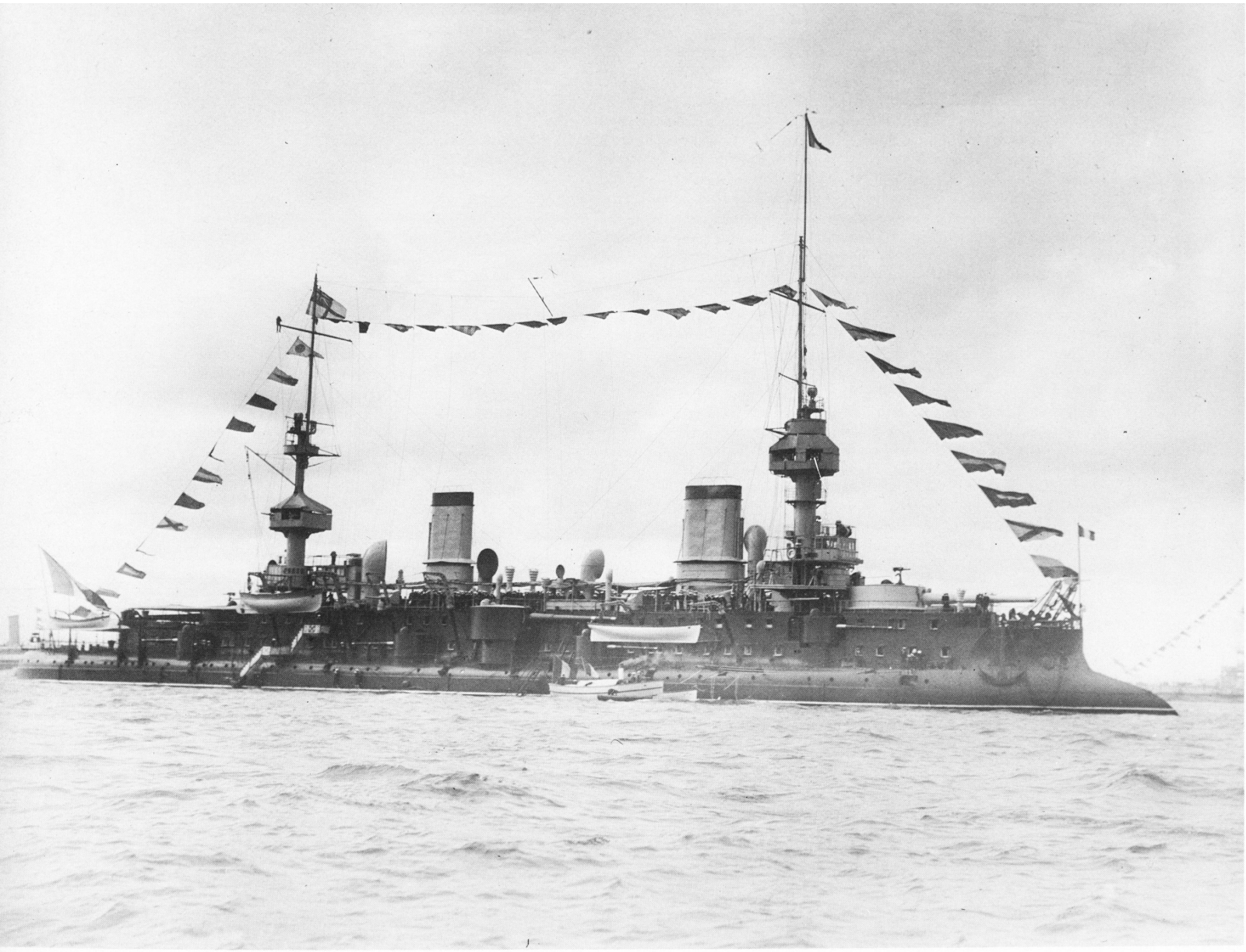
During World War I the *Fuji* could steam at only 15 knots. Later she became a training ship for stokers, gunners and navigators. In 1922-3, under the Washington treaty of naval reductions, she was disarmed and her propellers were removed. Eventually she became a naval barracks training ship for seamen and pilots. By 1945 she was tender to the navigation school and later capsized. In 1948 the *Fuji* was scrapped at Yokosuka.

Masséna

FRENCH 1898 *Plate 39*

Built	St Nazaire
Laid down	1892
Launched	July 1895
Completed	1898
Dimensions	*Length overall* 384ft 8in
	Length waterline 380ft 6in
	Breadth 66ft 3in
	Draught 26ft 3in normal mean. 27ft maximum
Displacement	11,924 tons
Machinery	Triple screw
	Three vertical triple expansion engines
	Twenty-four Lagrafel d'Allest type boilers
	IHP natural draught. Sixteen boilers. 24 hours' trial 1898 = 9,650 = 15.49 knots
	IHP natural draught. Twenty-four boilers. 24 hours' trial 1898 = 13,460 = 17 knots
Bunkers	Coal. 635 tons normal. 800 tons maximum. (later included some oil)
Armament	Two 12-inch. 40 calibre. In single turrets forward and aft
	Two 10.8-inch. 40 calibre. In single turrets on each beam
	Eight 5.5-inch quick-firers. 45 calibre. In separate turrets
	Eight 3.9-inch quick-firers
	Twelve 3-pounder quick-firers
	Eight 1-pounders
	Four 18-inch diameter torpedo tubes. Two submerged. One on each quarter.
Armour	Creusot Harvey steel
	Belt 17.7-inch – 9.7-inch. 350ft by 7ft 6in
	Side above belt 4-inch
	Bulkhead 9½-inch
	12-inch turrets 15.7-inch – 13.7-inch
	Secondary turrets 3.9-inch
	Protective deck 2.7-inch
	Splinter deck below protective deck 1.5-inch (2ft 4in lower)
	Conning tower 13.7-inch
Complement	610 – 642

The *Masséna*, like many French battleships, was of unusual arrangement and mixed armament, weak in comparison to the British "Majestic" class *(Plate 32)*. The arrangement of the principal guns may be compared with the American armoured cruiser *Brooklyn (Plate 85)*, which had French influence in her design, and there was some similarity to the Russian battleship *Pobieda (Plate 46)*. She was developed from the earlier



92 *39 MASSENA, FRENCH 1898*

French battleship *Carnot*.

The position of the single forward 12-inch gun turret placed a heavy weight far forward and high, badly exaggerating pitching despite the buoyancy of the ram, made accurate shooting in a seaway difficult. The large and secondary turrets were turned electrically or by hand gear. The guns mounted at upper deck level were difficult to work in a sea, when the low freeboard allowed waves to sweep the after deck.

The *Masséna* cost over £1,100,000 but failed to achieve her designed speed of 18 knots. However, she averaged 17 knots for twenty-four hours, which was a good practical demonstration of her potential. She retained this speed for about ten years.

The curved deck edges and sides and circular turrets and barbettes were intended to resist and deflect shell hits. The pronounced ram bow was used in the design of many contemporary French battleships and cruisers, the intention being that any damage to the long ram would leave intact the watertight forward bulkheads of the hull proper. The tubular masts were similar to those fitted in German battleships of the time *(Plate 23)* and resisted risk of masts failing by damage in action. The large profile, flat-sided funnels reduced the number needed by combining uptakes, but added considerably to the target silhouette.

The rectangular side ports for light and air were often fitted in French, Italian and Greek warships intended principally for Mediterranean service, but constituted a structural weakness in the hull. The cumbersome stocked anchors were still widely used in most navies at the beginning of the twentieth century, although stockless anchors stowing in hawse pipes were already in use in many merchant ships.

French warships have always seemed to carry much larger ensigns than those of other navies, as shown in this photograph of the *Masséna* taken about 1905.

She was one of eight individual battleships built for the French fleet between 1891 and 1899, only another three being sister ships in a class. Thereafter French battleships were laid down in classes. The strengthening alliance between Britain and France after 1902 enabled the previous naval rivalry between the countries to end and offset the increasing naval building competition between Britain and Germany until the clash of World War I.

The *Masséna* remained an effective battleship until 1913, but was sunk to form a breakwater at Gallipoli in 1915.

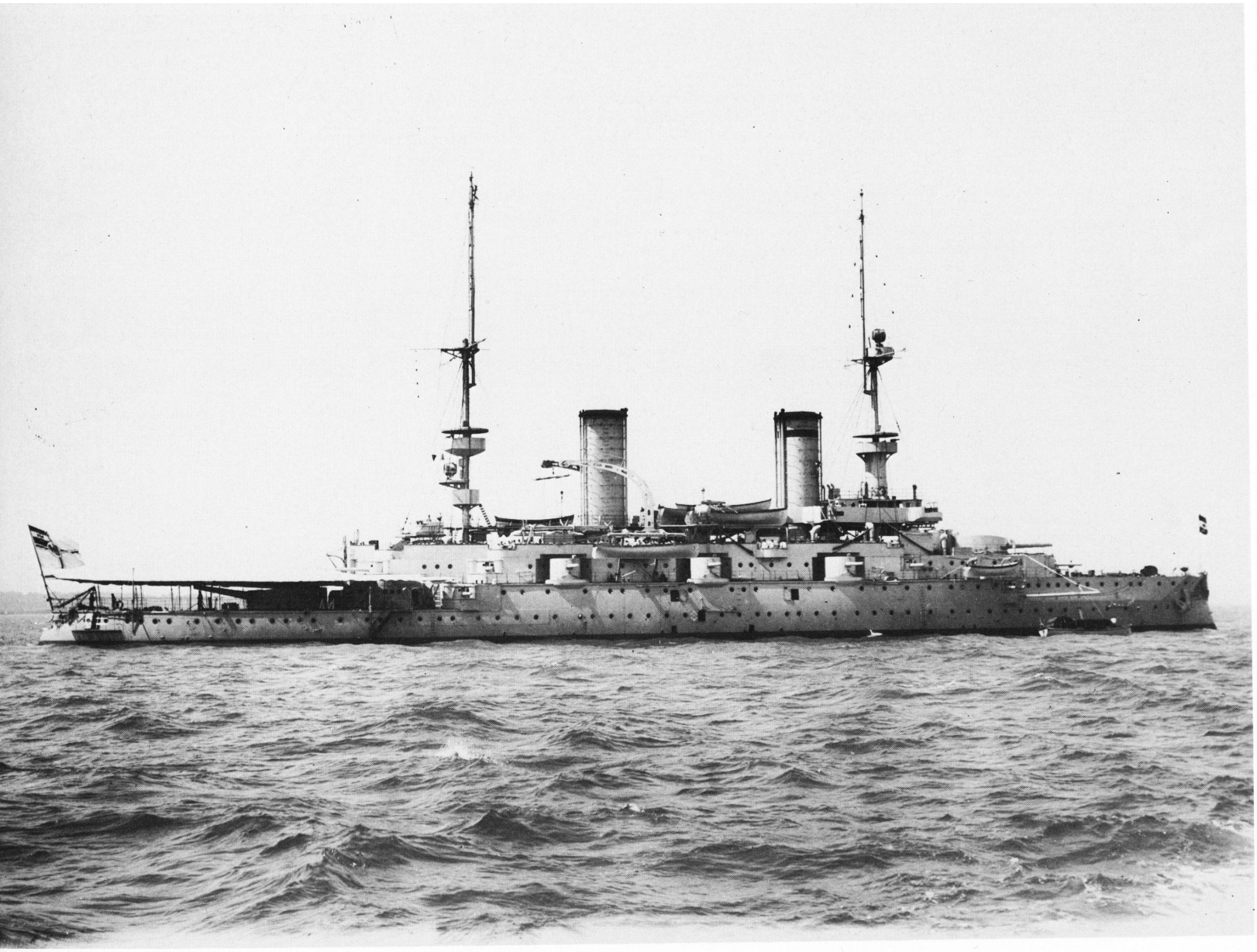
Kaiser Friedrich III

GERMAN 1898 *Plate 40*

Built	Naval dockyard, Wilhelmshaven
Laid down	May 1895
Launched	July 1896
Completed	September 1898
Dimensions	*Length overall* 410ft
	Length waterline 384ft
	Breadth 65ft 6in
	Draught 27ft 6in maximum
Displacement	11,150 tons
Machinery	Triple screw
	Three 3-cylinder vertical triple expansion engines by builders
	Eight cylindrical boilers. Four Thornycroft (later four Schultz)
	IHP = 13,500 = 18 knots
Bunkers	Coal. 650 tons normal. 1,050 tons maximum
Endurance	5,000 miles at 10 knots
Armament	Four 9.4-inch. 40 calibre. In turrets. Two forward and two aft
	Eighteen 5.9-inch quick-firers. Single mounts. Casemates and turrets
	Twelve 3.4-inch quick-firers. Single mounts
	Twelve 1-pounders
	Twelve machine-guns
	Six 18-inch diameter torpedo tubes. One bow. One stern. Two each broadside. All submerged
	During reconstruction four 5.9-inch guns removed
Armour	Krupp steel
	Belt 11¾-inch – 4-inch. 294ft long by 6ft 6in wide
	Barbettes 10-inch
	Turrets 10-inch
	Small turrets 6-inch
	Casemates 6-inch
	Bulkhead aft 8-inch
	Protective deck 3-inch – 2½-inch
	Forward conning tower 10-inch
	After conning tower 4-inch
Complement	655

The *Kaiser Friedrich III* was the name ship of a class of five sister battleships, the others being the *Kaiser Wilhelm II, Kaiser Wilhelm der Grosse, Kaiser Karl der Grosse* and the *Kaiser Barbarossa*, completed between 1898-1901. They cost an average of £962,500 to build and were designed as part of a striking force which in the event of war with Britain could attack the east coast of England, covering an invasion fleet and engaging in North Sea operations.

The armament of these ships was light for their size, the heaviest guns being only four 9.4-inch, compared with the four 12-inch usual in similar British ships. However, these 9.4-inch were capable of rapid fire and the



94 *40 KAISER FRIEDRICH III, GERMAN 1898*

strong secondary armament of eighteen 5.9-inch guns was powerful against the usual British twelve 6-inch and was further strengthened by twelve 3.4-inch guns. The disposition of armament was also unusual; the two forward 9.4-inch guns were mounted 30ft above the waterline in a turret mounted on a barbette surrounded by a deckhouse. The forward end of this had two casemates for 5.9-inch guns. Two more 5.9-inch guns were similarly mounted in the after deckhouse, firing above the twin after 9.4-inch turret which was mounted a deck lower. Four more casemates with 5.9-inch guns were disposed at the break of the raised deck and at the bow quarter position, with six other 5.9s mounted in small turrets, three on each beam, sponsoned out.

This photograph of the *Kaiser Friedrich III* was taken in 1902 and shows the large boat cranes which were a distinctive feature of German warships at the time. The tubular masts were low but topmasts were carried, with semaphores on both. Although these ships were good steamers, they had high coal consumption and the 9.4-inch guns were slow in rate of fire. Generally they were unsatisfactory battleships but were followed by the slightly larger but very similar "Wittelsbach" class of five ships.

The *Kaiser Friedrich III* and her sisters were the pride of the German fleet for a few years but by 1906 she was docked for reconstruction and reboilering. Four 5.9-inch guns were removed, with a considerable amount of deckhouses and superstructure. However, this reduction in weight so reduced draught that the lower edge of the armour belt was brought close to the waterline and this, with the poor armament, caused the class to be relegated to subsidiary service or reserve. The strong tubular masts were removed and replaced by pole masts, with topmasts for wireless aerials stayed to wide spreaders in the current German fashion.

She underwent a further refit at Wilhelmshaven during 1908-9 but was almost obsolete and remained in reserve until 1916 when, like many older major German warships, she was disarmed to release munitions and crew for the growing numbers of submarines and destroyers being built for the fleet. She subsequently served at Kiel as a detention ship and during 1918 became an accommodation ship at Flensburg. After the surrender of the German fleet she was discarded in December 1919 and was scrapped at Kiel during 1920. All her sister ships survived the war and were scrapped at that time.

Albion

BRITISH 1901 *Plate 41*

Built	Thames Ironworks, Blackwall, London
Laid down	December 1896
Launched	June 1898
Completed	June 1901
Dimensions	*Length overall* 418ft
	Length 390ft
	Breadth 74ft
	Draught 25ft 10in mean. 26ft 6in maximum
Displacement	13,150 tons. 14,320 tons deep-loaded
Machinery	Twin screw
	Two 3-cylinder vertical inverted triple expansion engines by Maudslay, Sons and Field
	Twenty Belleville type water tube boilers
	IHP trials 8 hours natural draught = 13,885 = 17.8 knots (trial carried out in gale conditions)
Bunkers	Coal. 800 tons normal. 1,800 tons maximum
Armament	Four 12-inch. 35 calibre. Two forward and two aft
	Twelve 6-inch quick-firers
	Ten 12-pounder quick-firers
	Six 3-pounders
	Two machine-guns
	Four 18-inch diameter submerged torpedo tubes
Armour	Krupp and Harvey steel
	Belt 6-inch amidships. 2-inch bow. 195ft long by 14ft wide
	Forward bulkhead 10-inch – 8-inch – 6-inch
	After bulkhead 12-inch – 10-inch – 6-inch
	Barbettes 12-inch – 6-inch
	Barbette shields 8-inch
	Casemates 6-inch
	Protective decks 3-inch – 2-inch
	Main deck 1-inch
	Forward conning tower 12-inch
	After conning tower 3-inch
Complement	682 – 750. As a flagship 780

The *Albion* was one of the "Canopus" class battleships which were laid down between 1896-98 and included the *Glory, Albion, Goliath, Ocean, Vengeance* and *Canopus*. They were designed for service in the Far East, to counter Japanese naval expansion after their victorious war against China during 1894-5, when the Japanese fleet proved superior to the ill-equipped Chinese Navy. Draught of the *Canopus* type was limited for passage of the Suez canal and they were the first British battleships to have water tube boilers, which had only previously been used in small craft and were to be fitted in the large cruisers *Terrible* and *Powerful*, then building. Distribution of the boilers enabled a fore and aft placing of the funnels, the after one being largest in diameter.

In the "Canopus" type Krupp side armour was fitted for the first time in British warships, and its relative thinness caused the battleships to be regarded as inferior to their predecessors, even though its power of resistance was superior to twice the thickness of compound armour.

41 ALBION, BRITISH 1901

Improvements in armament enabled the *Albion*'s four 12-inch guns to fire one round in 32 seconds. The secondary 6-inch guns in the main deck end casemates were sponsoned out to improve ahead and astern fire, giving an unusual appearance for a British ship.

The *Albion* cost £858,745 to build and her launch at the Thames Ironworks yard was disastrous; the wash as she left the ways carried away spectator stands and drowned thirty people, mainly women and children.

She commissioned in June 1901 for the China station, serving there until 1905. The "Canopus" class were the principal force of the British China squadron during that period, which ended when the alliance between Britain and Japan enabled them to return for service in British waters.

The *Albion* joined the Channel fleet in August 1905 and collided with the battleship *Duncan* off Lerwick, Shetland Isles, during September, without sustaining damage. During April 1906 she commissioned in the reserve at Chatham for refitting of machinery and boilers which lasted until December 1906. In February 1907 she was temporarily with the Home fleet at Portsmouth and in March joined the Atlantic fleet. The *Albion* refitted at Gibraltar during 1908-9, when fire control equipment was installed. She became the parent ship for the 4th division of the Home fleet at the Nore in August 1909 and in May 1912 transferred to the 3rd fleet at the Nore and refitted at Chatham. During 1913 she lay at Pembroke dockyard.

The *Albion* and her sisters saw varied service during World War I, in areas as far apart as the Falklands and Archangel. In August 1914 the *Albion* was a unit of the 8th battle squadron in the Channel and later that year sailed for the Cape and East African station. In February 1915 she was sent to the Dardanelles and participated in the bombardment of the Turkish forts and shore positions. On 25th April she was part of a force covering the landing at Helles and suffered shell damage on 25th April and 2nd May. During October 1915 the *Albion* transported troops to Salonika and afterwards returned to England to be based on the east coast from 1916-18 as part of a force guarding against the repetition of German naval raids. She became an accommodation ship at Devonport in 1918 and was sold during 1919 to be broken up at Morecambe, Lancashire.

This photograph was taken at the Spithead naval review of 1911, in honour of the coronation of King George V. The *Albion*, in the foreground, had been equipped with fire control arrangements housed in the upper fore top and the mizzen top platforms. The layout of the secondary armament and the net shelf at main deck level are clearly shown. Although wireless had been fitted, battleships retained long yards and fidded topmasts.

Irresistible

BRITISH 1902 *Plate 42*

Built	Royal Naval dockyard, Chatham
Laid down	April 1898
Launched	December 1898
Completed	February 1902
Dimensions	*Length overall* 431ft 8in
	Length 400ft
	Breadth 75ft
	Draught 25ft – 26ft mean. 27ft 9in maximum
Displacement	15,000 tons
Machinery	Twin screw
	Two 3-cylinder vertical triple expansion engines by Maudslay, Son and Field
	Twenty Belleville type water-tube boilers
	IHP full power trial 8 hours = 15,500 = 18.2 knots
Bunkers	Coal. 900 tons normal. 2,200 tons maximum
Endurance	3,000/8,000 miles at 10 knots
Armament	Four 12-inch 50-ton guns. 40 calibre. 850 pounds shell. Two forward and two aft
	Twelve 6-inch quick-firers. 45 calibre
	Sixteen 12-pounder quick-firers
	Six 3-pounders
	Two machine-guns
	18-inch diameter torpedo tubes. Four submerged broadside
Armour	*Belt and lower deck sides* 9-inch. 216ft long by 15ft wide
	Bulkheads 12-inch – 10-inch – 9-inch
	Forward side plating 3-inch
	Aft side plating 1½-inch
	Barbettes 12-inch – 6-inch
	Barbette shields 10-inch – 8-inch
	Casemates 6-inch
	Deck 3-inch – 2-inch
	Main deck 1-inch
	Conning tower forward 14-inch
	Conning tower aft 3-inch
Complement	780. 810 as flagship

The three "Formidable" class battleships were laid down under the 1897 naval programme and were to be of greater displacement than the preceding "Canopus" type, particularly as the Japanese and French Navies were adding ships of about 15,000 tons to their battle fleets. The class comprised the *Formidable*, *Irresistible* and *Implacable*. They were

98 *42 IRRESISTIBLE, BRITISH 1902*

based on the "Majestic" type and were superior to the "Canopus" class. The four 12-inch, 40-calibre guns had improved shell-handling equipment and protection, and the armour was generally heavier. Water tube boilers were then established in British naval engineering and their efficiency increased power and speed. The inward-turning propellers of these ships made them difficult to manoeuvre at slow speeds.

Completion of the *Irresistable* was delayed because her engines were being constructed by Maudslay, Son and Field, the notable London engineers, who were sliding into liquidation at the time. The *Irresistible* cost £1,048,136 to build and commissioned at Chatham in February 1902, for the Mediterranean fleet. During March she collided with the Norwegian steamship *Clive* and sustained considerable damage. In October 1905 she grounded at Malta and was repaired, and the opportunity was taken to fit fire controls. She was again refitted at Malta between October 1907-January 1908 and then returned to England to join the Channel fleet. Later in the month she collided with a merchant schooner in fog, without damage. She joined the 1st division, Home fleet in 1909 when this photograph was taken of her steaming through the Solent, between the Isle of Wight and the Hampshire shore, with a fleet of similar ships and cruisers.

She was reduced to nucleus crew in May 1910 and refitted at Chatham between June and February 1911, when she became part of the Nore division, Home fleet. She went to the Portsmouth sub-division, Home fleet, in August 1911 and during November was sent to the Tyne where her crew were transferred temporarily to the new battleship *Monarch* for her trials. In March 1912 the *Irresistible* joined the Devonport division of the Home fleet, later joining the 5th battle squadron during 1912-14, serving on Channel patrol at the commencement of World War I.

She was ordered to the Dardanelles in February 1915 and was in the 2nd division bombarding the Turkish positions on the 25th, and on the 1st March the action continued in a gale, with the ships suffering heavy fire.

During an attempt to force the Dardanelles on March 18th, the *Irresistible* was heavily struck by shell fire from the Turkish forts and her two turrets put out of action. Shortly afterwards she struck one of the many mines the Turks had laid and her crew were taken off, twenty being killed. The current set the abandoned battleship within range of the narrows forts and she was sunk by their guns about three hours after being mined. It was a disastrous day for the Allies; the French battleship *Bouvet* had blown up shortly before and the British battleship *Ocean* was sunk by mine and gunfire afterwards, while the British battlecruiser *Inflexible* and the French battleships *Gaulois* and *Suffren* were badly damaged.

Implacable

BRITISH 1901 *Plate 43*

Built	Royal Naval dockyard, Devonport
Laid down	July 1898
Launched	March 1899
Completed	September 1901
Dimensions	*Length overall* 431ft 8in
	Length 400ft
	Breadth 75ft
	Draught 25ft – 26ft mean. 27ft 9in maximum
Displacement	14,480 tons at 25ft draught. 15,805 tons at full draught
Machinery	Twin screw
	Two 3-cylinder vertical triple expansion engines by Laird
	Twenty Belleville type water tube boilers
	IHP full power trial 8 hours = 15,500 = 18 knots
Bunkers	Coal. 900 tons normal. 2,200 tons maximum
Endurance	3,000/8,000 miles at 10 knots
Armament	*Original*
	Four 12-inch 50-ton guns. 40 calibre. 850 pounds shell. Two forward and two aft
	Twelve 6-inch quick-firers. 45 calibre
	Sixteen 12-pounder quick-firers
	Six 3-pounders
	Two machine-guns
	18-inch diameter torpedo tubes. Four submerged broadside
	Alterations 1918
	Eight 6-inch quick-firers redisposed on upper deck
	Eight 12-pounder quick-firers redisposed
Armour	*Belt and lower deck sides* 9-inch. 216ft long by 15ft wide
	Bulkheads 12-inch – 10-inch – 9-inch
	Forward side plating 3-inch
	Aft side plating 1½-inch
	Barbettes 12-inch – 6-inch
	Barbette shields 10-inch – 8-inch
	Casemates 6-inch
	Deck 3-inch – 2-inch
	Main deck 1-inch
	Conning tower forward 14-inch
	Conning tower aft 3-inch
Complement	780

The *Implacable* cost £989,116 to build and commissioned at Devonport in September 1901 for service with the Mediterranean fleet. Fire controls were fitted at Malta between 1904-6. Two boiler explosions occurred on

43 *IMPLACABLE,*
BRITISH 1901

board – in July 1905 and August 1906 – the first killing two and injuring others. She returned to refit at Chatham during 1908-9 and joined the Channel fleet in February 1909. During April she transferred to the 1st division, Home fleet and joined the Atlantic fleet in June. Later she was with the 3rd battle squadron, 1st fleet and in May 1912 transferred to the 2nd fleet at the Nore, with a nucleus crew. Later in 1912 until 1914 the *Implacable* was a unit of the 5th battle squadron and at the commencement of World War I was engaged in Channel patrols.

The *Implacable* was sent to the Dardanelles in March 1915 and participated in the bombardment covering the landing at Helles during April, and in subsequent operations. In May she was one of several British "pre-Dreadnought" battleships sent to the Adriatic to stiffen the Italian fleet against the possibility of the Austro-Hungarian fleet breaking out into the Mediterranean. Later that year and early in 1916 she served in the Indian Ocean, between the Red Sea and the East Indies. The *Implacable* returned to the Mediterranean, where her armament was altered at Malta, the main-deck 6-inch gun casemates being plated-in and four of the guns remounted on each side on the deck above; the displaced 12-pounders being remounted and some deleted. This was completed in 1918 when she returned to England and joined the northern patrol between Scotland and Norway until 1919. She was sold to be broken up in Germany during 1921.

This photograph was taken during the Coronation naval review at Spithead in 1911. The ship's company are manning the side and are drawn up in review order, with marines on the bridge, ready to salute the sovereign with three cheers as he steams through the lines of British and foreign warships. King George V had been trained and had served as an active naval officer and the occasion must have filled him with more than usual pride of review. The guns of the secondary armament are trained outboard, above the torpedo net shelf at main deck height. Fire controls had been fitted in the upper fore top. The strake of 3-inch armour plating carried forward to the stem is clearly visible against the thinner ordinary shell plating.

Illinois

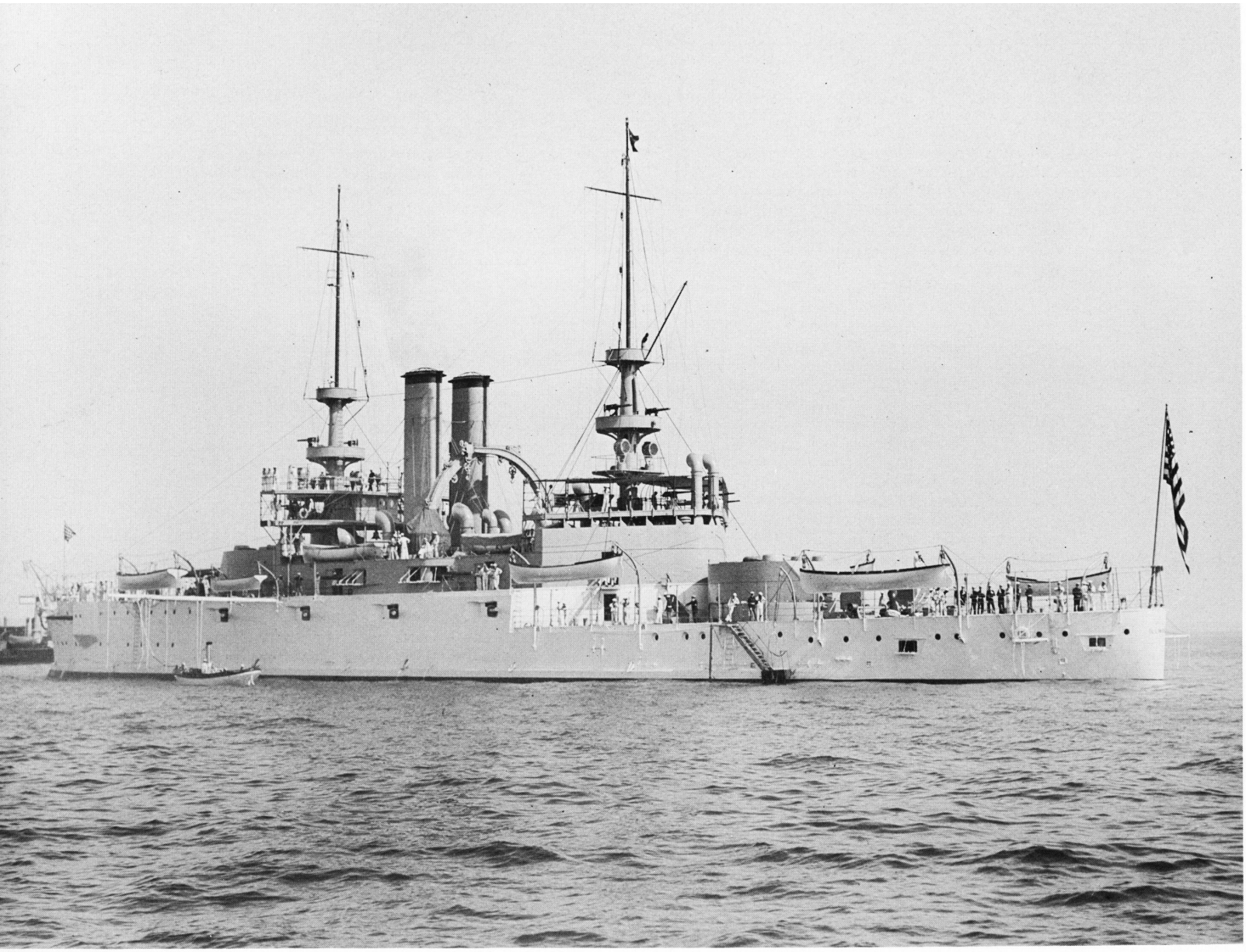
UNITED STATES 1901 *Plate 44*

Official number	BB7
Built	Newport News Shipbuilding Co
Laid down	February 1897
Launched	October 1898
Completed	1901
Dimensions	*Length overall* 375ft 3in
	Length waterline 368ft
	Breadth 72ft 3in
	Draught 23ft 6in mean. 26ft maximum
Displacement	11,565 tons normal
Machinery	Twin screw
	Reciprocating triple expansion engines
	Eight single-ended Mosher type boilers
	IHP = 10,000 normal. 11,920 maximum
	Speed = 16 knots nominal. 16.2 knots maximum
Bunkers	Coal. 850 tons normal. 1,450 tons maximum
Armament	*Original*
	Four 13-inch. 35 calibre. Two forward and two aft
	Fourteen 6-inch quick-firers. 40 calibre. In casemates
	Seventeen 6-pounders
	Sixteen 1-pounders
	Four 18-inch torpedo tubes above water
	Alterations in 1918
	Secondary armament reduced to eight 6-inch
	Two 3-inch anti-aircraft added
Armour	Harvey
	Main belt 16-inch – 9¼-inch. Bow 4-inch
	Turrets 14-inch
	Barbettes 15-inch – 10-inch
	Deck 4-inch
	Conning tower 10-inch
Complement	711

The *Illinois* and her sister ships *Alabama* and *Wisconsin* were ordered during 1896 and were completed between 1900 and 1901. There was some British and German influence in the design and the funnel arrangement was reminiscent of the British "Royal Sovereign" class. They cost about £950,000 in contemporary values.

The *Illinois* participated in the circumnavigation of the world by the "Great White fleet", to show the strength of the new United States Navy around the world. This squadron of sixteen battleships and three auxiliaries sailed from Hampton Roads, Virginia, on December 16th 1906 and returned on February 22nd 1909. At that time American warships retained the white hulls and buff funnels of the fleet's late-19th-century livery, but in 1910 a light grey-green colour was introduced, similar to that in many other fighting fleets.

The *Illinois* underwent reconstruction during 1909. The fore military mast was replaced by a circular lattice "cage mast" and the mainmast was similarly replaced in 1911, when four 3-inch guns replaced the 6-pounders. The torpedo tubes were removed. Refitting cost about £130,000 in contemporary value but by 1913 the *Illinois* was regarded as a second class battleship. Two 3-inch anti-aircraft guns were added to the armament by 1918, for aircraft attack had become a positive threat to warships by the end of World War I.



44 ILLINOIS, UNITED STATES 1901

45 NORGE, NORWEGIAN ARMOURED COAST DEFENCE SHIP 1901

The *Illinois* remained a fleet unit until about 1921 and during 1924 became a training ship for engineering personel, numbered *IX15*. In January 1941 she was renamed *Prairie State* and was scrapped at Baltimore, Maryland, during 1956.

The *Alabama* was sunk as a target in September 1921 and the *Wisconsin* scrapped during 1922.

Norge

NORWEGIAN ARMOURED COAST DEFENCE SHIP 1901 *Plate 45*

Built	Armstrong and Co., Elswick
Laid down	1899
Launched	March 1900
Completed	1901
Dimensions	*Length overall* 301ft 3in
	Length between perpendiculars 290ft
	Breadth 50ft 6in
	Draught 16ft 6in normal. 17ft 8in maximum
Displacement	3,847 tons normal. 4,166 tons maximum
Machinery	Twin screw
	Two 4-cylinder triple expansion engines by Hawthorn, Leslie and Co
	Eight Yarrow type boilers
	IHP = 4,800 = 16.5 knots
Bunkers	Coal. 250 tons (later 440 tons) normal. 400 tons (later 550 tons) maximum
Armament	Two 8.2-inch quick-firers. 44 calibre. One in turret forward and one in turret aft
	Six 5.9-inch quick-firers. 46 calibre. Four in casemates. Two in shields
	Eight 12-pounder quick-firers
	Six 3-pounder quick-firers
	Two 18-inch diameter torpedo tubes submerged
	Two 3-pounder anti-aircraft guns added by 1920
Armour	Krupp steel
	Belt 6-inch – 4-inch
	Turrets 8-inch
	Slopes of protective deck 2-inch
	Casemates 5-inch
	Conning tower 6-inch
Complement	248 (later 261)

The *Norge* and her sister ship *Eidsvold* were designed and built at Elswick by Armstrong, Whitworth and Co Ltd for the Royal Norwegian Navy as armoured coast defence ships of moderate cost and maximum effectiveness on limited dimensions. They were a miniature version of "pre-Dreadnought" battleships, with an arrangement and profile satisfying to national pride, and followed the slightly smaller, Tyne-built coast defence ships *Harald Haarfagre* and *Tordenskjold*, completed in 1898 and 1899. At that time the Norwegian, Swedish and Danish Navies were being expanded, probably due to the rise of nearby Germany as an ambitious power and to counter any threat to the expected neutrality of their coastal waters by German or Russian warships.

The *Norge* and *Eidsvold* cost £350,000 each to build and may be compared with the Danish *Olfert Fischer (Plate 56)* or Sweden's *Dristigheten*.

This photograph of the *Norge*, taken in 1902, shows the handsome and well-balanced appearance. The weak main armament of two 8.2-inch guns was backed by the relatively strong secondary six 5.9-inch in single mounts, disposed in casemates at each end of the superstructure and two in shields on the upper deck amidships. The unusual choice of 8.2-inch guns followed the armament of the *Harald Haarfagre* and *Tordenskjold* and of several contemporary Swedish coast defence ships.

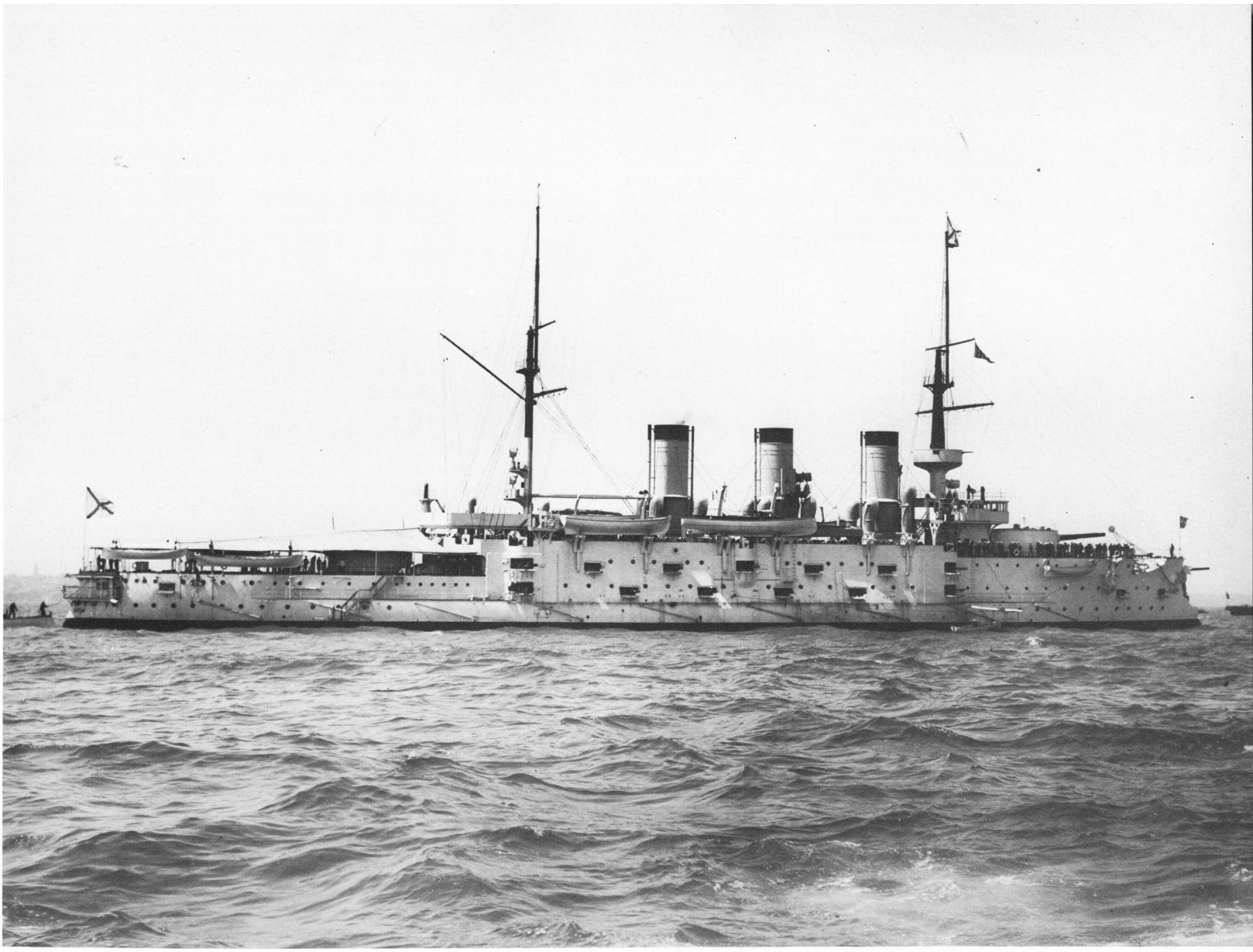
For a period around 1905 the navies of Sweden and Norway were combined under a political union. Both services were efficient, their ships constantly drilled in navigating the difficult channels of the coasts and fjords and in manoeuvres against supposed blockading fleets. Three-quarters of Norwegian personnel were conscripts. Gunnery and torpedo drills were regular and frequent and navigation excellent. The engineering was good but many Scandinavian warships had heavy coal consumption. The *Norge* and *Eidsvold* remained coal-fired and unaltered in arrangement and appearance throughout their peaceful existence – Norway was neutral during World War I.

When the Germans invaded neutral Norway in the spring of 1940, their reception varied from collaboration to fierce resistance. The small and outdated Norwegian fleet fought bravely. The *Norge* and *Eidsvold* were sent north, probably to preserve the ships as long as possible and in hope of a ceasfire. Both were torpedoed at Narvik by German destroyers on 9th April 1940. They went down fighting.

Pobieda

RUSSIAN 1902 *Plate 46*

Built	New Admiralty Yard, St Petersburg
Laid down	August 1898
Launched	May 1900
Completed	1902
Dimensions	*Length overall* 435ft



105 *46 POBIEDA, RUSSIAN 1902*

	Length between perpendiculars 411ft
	Length waterline 424ft
	Breadth 71ft 6in
	Draught 27ft 3in at 12,674 tons displacement
Displacement	12,674 tons
Machinery	Triple screw
	Three reciprocating 3-cylinder triple expansion engines
	Thirty Belville type boilers
	Designed continuous sea speed = 16 knots
	Speed at 13,500 tons displacement = 18 knots
	IHP trials = 15,492 = 18.51 knots
Bunkers	Coal. 1,063 tons normal. 2,058 tons maximum. Plus 120 tons oil fuel
Endurance	10,000 miles at 10 knots
Armament	*Original*
	Four 10-inch Obukhoff guns. 45 calibre. Two forward and two aft
	Eleven 6-inch. In casemates
	Twenty 3-inch. At sides
	Twenty-six smaller guns
	Six torpedo tubes. Two submerged. Four above water
	Electric hoists to all guns. Large guns electrically controlled
	Modified as Japanese "Suwo"
	Four 10-inch Obukhoff guns. 45 calibre (2 x 2)
	Sixteen 3-inch. 40 calibre
	Two 18-inch diameter torpedo tubes
Armour	Krupp and Harvey
	Main belt 9-inch – 4-inch at ends
	Lower belt 5-inch
	Deck 2¾-inch on slopes. 2-inch on flat
	Turrets 10-inch
	Turret bases 9-inch
	Casemates 5-inch
	Conning towers 10-inch
Complement	732

The *Pobieda* and her sister ships *Peresviet* and *Osliabia* were intermediate between battleships and armoured cruisers. Although their 10-inch guns were capable of long-range action, they were not so effective as the 12-inch carried by most contemporary battleships and the armour protection was comparatively light. The considerable freeboard of these ships was principally due to improved living accomodation, but provided a large target. Each cost the equivalent of £1,000,000.

The mounting of the 3-inch gun battery on two decks at the sides was unusual. In arrangement she could be compared with the French *Massena (Plate 39)*.

The *Pobieda* arrived at Port Arthur, Russia's Far East naval base, during July 1903 to join the fleet which at the outbreak of war with Japan in February 1904 included seven battleships, six large cruisers and twenty-five destroyers.

On April 13th 1904 the *Pobieda* was with a squadron of major Russian ships which engaged Japanese cruisers off Port Arthur. Shortly after the loss by mine of the battleship *Petropavlosk*, the *Pobieda* struck a mine near the Tiger Peninsular but remained afloat and the squadron returned to Port Arthur where repairs were commenced, and completed in June. On 22nd of June the *Pobieda*'s captain was taken ill and was relieved on the eve of a sortie by the fleet to attack the Japanese base in the Elliot Islands. They retired on meeting a Japanese force attempting to entice them seaward.

On August 10th the Russian fleet again sortied and the *Pobieda* had engine-trouble which slowed the ships. They engaged a Japanese force but again retired to Port Arthur to await Russia's 2nd Pacific squadron which was steaming out from the Baltic as reinforcement.

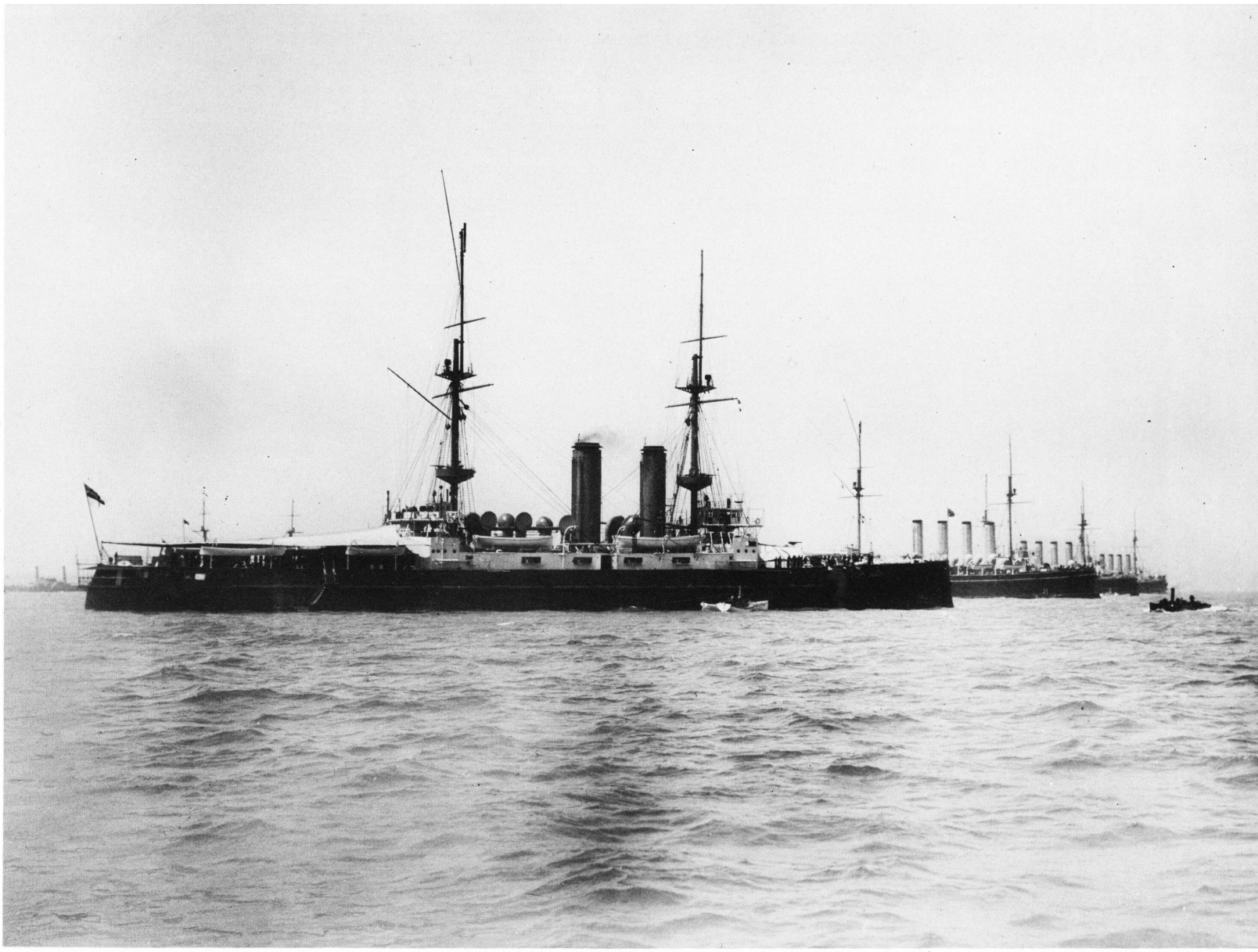
This ill-fated force was however defeated by the Japanese at the battle of Tsushima where the *Pobieda's* sister ship *Osliabia* was the first Russian ship to be sunk. As the Japanese advanced on land to besiege Port Arthur the *Pobieda* and *Peresviet* were scuttled. The *Pobieda* was the most heavily damaged but both were raised and refitted at Yokosuka for service in the Japanese fleet. *Pobieda*'s forward military mast was removed during the refit, together with four 3-inch guns, the bow 6-inch gun, three torpedo tubes and all the 3- and 1-pounder guns. About 800 tons of ballast were shipped to improve stability.

Commissioned into the Japanese fleet in October 1908 as the *Suwo*, she rated as a second class battleship until 1920, later being reclassed as a first class coast defence ship. Afterwards she served as a training ship for engineers and cadets. The *Suwo* was discarded in April 1922. She capsized during removal of the armour, was raised and moored at Kure until the end of World War II, being broken up in 1945.

London

BRITISH 1902 *Plates 47 and 48*

Built	Royal Naval dockyard, Portsmouth
Laid down	December 1898
Launched	September 1899
Completed	June 1902
Dimensions	*Length overall* 431ft 8in
	Length 400ft
	Breadth 75ft
	Draught 26ft 6in normal



107 *47 LONDON, BRITISH 1902*

108 *48 LONDON, BRITISH 1902*

Displacement	14,420 tons normal. 15,640 tons deep load
Machinery	Twin screw Two vertical triple expansion engines by Earle Twenty Belleville type water-tube boilers IHP = 15,000 = 18 knots
Bunkers	Coal. 900/2,100 tons
Endurance	3,000/7,000 miles at 10 knots
Armament	*Original* Four 12-inch 50-ton. 40 calibre. Two forward and two aft Twelve 6-inch quick-firers. 45 calibre Sixteen 12-pounder quick-firers Six 3-pounders Two machine-guns 18-inch diameter torpedo tubes submerged broadside. Two forward. Two aft *Secondary armament altered 1916* Eight 6-inch quick-firers redisposed on upper deck Eight 12-pounder quick-firers redisposed
Armour	Krupp steel *Belt* 9-inch – 3-inch. 250ft long by 15ft wide *Aft bulkhead only* 12-inch – 10-inch – 9-inch *Barbettes* 12-inch – 8-inch – 6-inch *Barbette shields* 10-inch – 8-inch *Casemates* 6-inch *Lower deck* 2½-inch *Middle deck* 2-inch – 1-inch *Main deck* 2-inch – 1½-inch *Forward conning tower* 14-inch *After conning tower* 3-inch
Complement	733. 789 as flagship

Three battleships of the "London" class were authorised under the 1898 British naval programme. They were a transitional design between the "Formidable" type *(Plate 42 and 43)* and the "Duncan" class. The *London*, *Bulwark* and *Venerable* were laid down in 1898 and 1899, the sister ships *Queen* and *Prince of Wales* following in 1900. Appearance was similar to the "Formidable" type but the armour protection was rearranged.

The *London* cost £1,036,393, to build and commissioned in June 1902 at Portsmouth as flagship for the Coronation naval review of King Edward VII. Afterwards she sailed to join the Mediterranean fleet, serving there until April 1907 and suffering engine defects and other machinery troubles. She returned in June 1907 to join the Home fleet at the Nore. A year later she was transferred to the Channel fleet as rear-admiral's flagship, then moved to Chatham for a major refit. In 1910 she commissioned as rear-admiral's flagship, Atlantic fleet, and in May 1912 joined the 3rd battle squadron, 1st fleet, with a nucleus crew. Later that month she transferred to the 2nd fleet, 5th battle squadron, at the Nore, where she was fitted with a temporary runway extending from the forward side of the bridge to the stemhead, from which experiments in launching seaplanes were successfully made, similar trials being carried out from the battleship *Hibernia*. Soon after, the *London* collided with the merchant ship *Don Benito* off Hythe, and later in 1912 joined the 5th battle squadron.

At the commencement of World War I the *London* participated in Channel patrols before being ordered to the Mediterranean in March 1915 to replace losses in the fleet attacking the Dardanelles. During May she, with the battleships *Implacable*, *Prince of Wales* and *Queen*, was ordered to the Adriatic to reinforce the Italian fleet and prevent the breaking out of the Austro-Hungarian fleet into the Mediterranean.

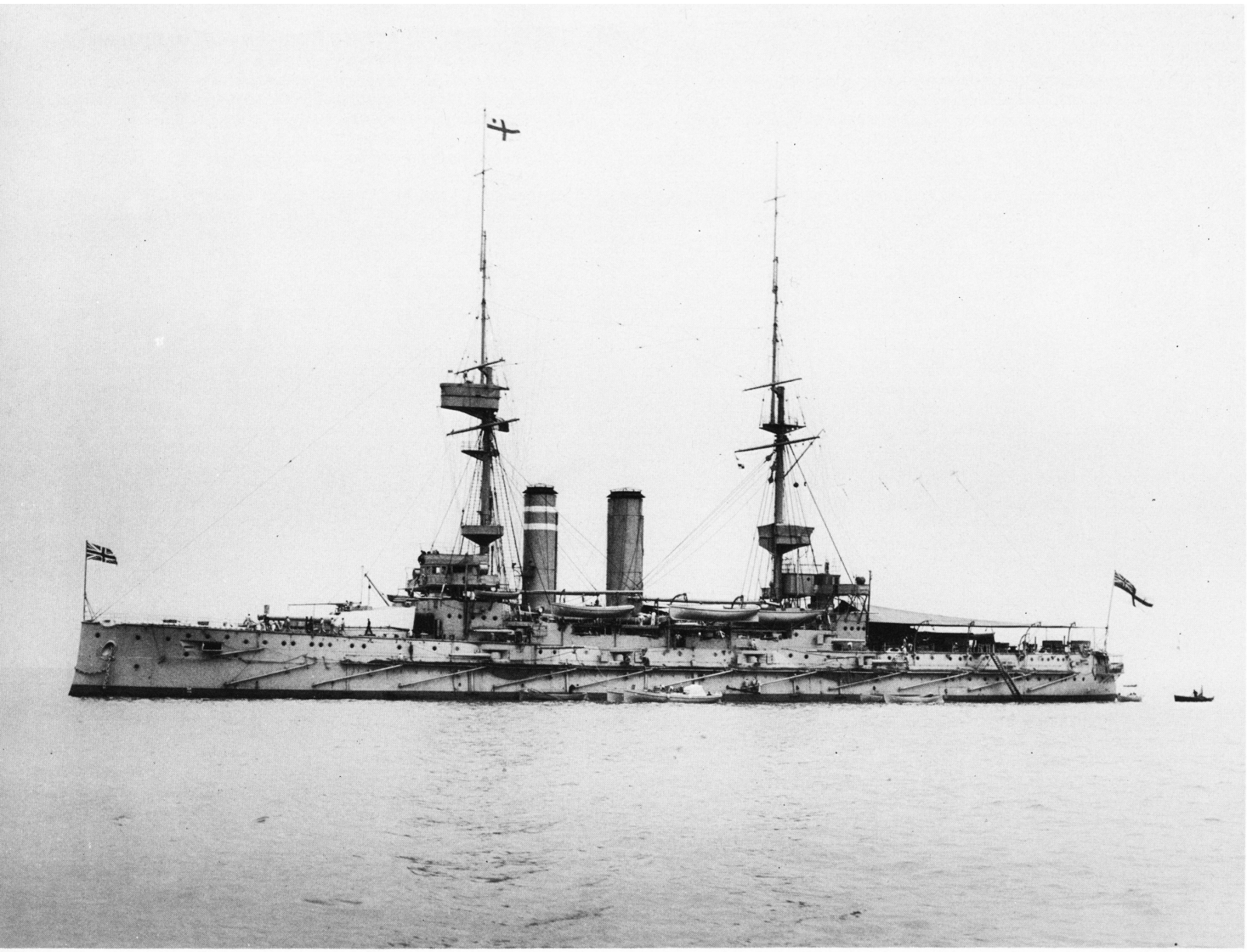
In 1916 the *London*'s secondary armament was altered similarly to that of the *Implacable* and during 1917 she was converted to a minelayer, the after barbette being removed along with the secondary armament. A 6-inch gun was mounted on the after deck. During 1919 she became a reserve depot ship and was sold during 1920 to be broken up in Germany.

Plate 47 shows the *London* as flagship of the 1902 Coronation naval review at Spithead with a line of four-funnelled cruisers beyond, possibly ships of the "Diadem" class. *Plate 48* was taken in 1911 and the *London* has undergone modernisation; fire controls are fitted to the fore top and wireless equipment is spread at the mastheads. Although outdated by the "Dreadnought" type ships, the large number of earlier battleships in all major fleets remained a substantial part of the backbone for several years and were included in the foremost battle squadrons.

Prince of Wales

BRITISH 1904 *Plate 49*

Built	Royal Naval dockyard, Chatham
Laid down	March 1901
Launched	March 1902
Completed	March 1904
Dimensions	*Length overall* 431ft 8in *Length* 400ft *Breadth* 75ft *Draught* 26ft 6in normal
Displacement	14,140 tons normal. 15,380 tons deep load
Machinery	Twin screw Two vertical triple expansion engines by Greenock Foundry Co Twenty Belleville type water-tube boilers IHP = 15,000 = 18 knots



110 *49 PRINCE OF WALES, BRITISH 1904*

Bunkers	Coal. 900/2,100 tons
Endurance	3,000/7,000 miles at 10 knots
Armament	Four 12-inch 50-ton. 40 calibre. Two forward and two aft
	Twelve 6-inch quick-firers. 45 calibre
	Sixteen 12-pounder quick-firers
	Six 3-pounders
	Two machine-guns
	18-inch diameter torpedo tubes submerged broadside. Two forward. Two aft
Armour	Krupp steel
	Belt 9-inch – 3-inch. 250ft long by 15ft wide
	Aft bulkhead only 12-inch – 10-inch – 9-inch
	Barbettes 12-inch – 8-inch – 6-inch
	Barbette shields 10-inch – 8-inch
	Casemates 6-inch
	Lower deck 2½-inch
	Middle deck 2-inch – 1-inch
	Main deck 2-inch – 1½-inch
	Forward conning tower 14-inch
	After conning tower 3-inch
Complement	733. 789 as flagship

The *Prince of Wales* was named for the heir to the throne, Prince George, later King George V. She cost £1,193,308 to build and on completion in March 1904 went into fleet reserve at Chatham and commissioned for service with the Mediterranean fleet in May. In July 1905 she collided with the merchant ship *Enidween* off Oran and suffered damage. The *Prince of Wales* returned to England in May 1906 and commissioned in the reserve at Portsmouth, refitting there during June-November before proceeding to the Mediterranean where she became rear-admiral's flagship until August 1907. She became Atlantic fleet flagship of the commander-in-chief from November 1908 until December 1910. This photograph was taken in 1909 and shows the *Prince of Wales* wearing the flag of a vice-admiral. Fire controls had been fitted in the tops and she carries extensive wireless aerials. Between February 1911 and May she refitted at Gibraltar and in May 1912 transferred to the 3rd battle squadron, 1st fleet, being briefly flagship of the vice-admiral. She then joined the 2nd fleet at Portsmouth and during the autumn the 5th battle squadron. She was an unlucky ship; in April 1906 an engine-room accident killed three and injured four, a stokehold explosion in July 1909 caused damage, and in June 1913 she was run into by the submarine *C 32* during exercises and again sustained damage.

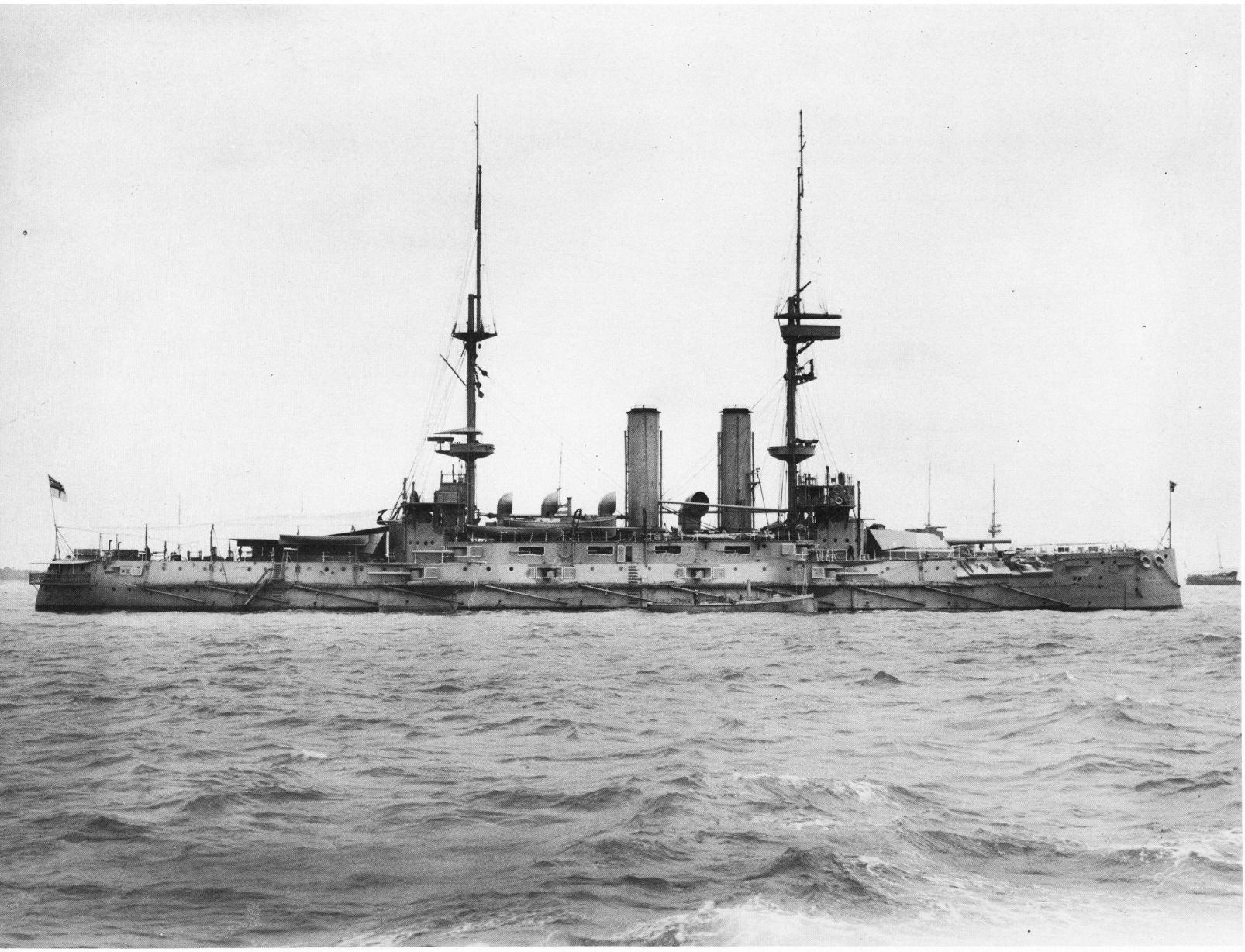
At the start of World War I the *Prince of Wales* was engaged in Channel patrols but was sent to the Dardanelles in March 1915 and provided support for the ANZAC landing in April. During May she went to the Adriatic in company with the *London*, *Implacable* and *Queen*. She was sold in 1920 to be broken up at Milford Haven.

Bulwark

BRITISH 1902 *Plate 50*

Built	Royal Naval dockyard, Devonport
Laid down	March 1899
Launched	October 1899
Completed	March 1902
Dimensions	*Length overall* 431ft 8in
	Length 400ft
	Breadth 75ft
	Draught 26ft 6in normal
Displacement	14,490 tons normal. 15,700 tons deep load
Machinery	Twin screw
	Two vertical triple expansion engines by Hawthorn Leslie
	Twenty Belleville type water-tube boilers
	IHP = 15,000 = 18 knots
Bunkers	Coal. 900/2,100 tons
Endurance	3,000/7,000 miles at 10 knots
Armament	Four 12-inch 50-ton. 40 calibre. Two forward and two aft
	Twelve 6-inch quick-firers. 45 calibre
	Sixteen 12-pounder quick-firers
	Six 3-pounders
	Two machine-guns
	18-inch diameter torpedo tubes submerged broadside. Two forward and two aft
Armour	Krupp steel
	Belt 9-inch – 3-inch. 250ft long by 15ft wide
	Aft bulkhead only 12-inch – 10-inch – 9-inch
	Barbettes 12-inch – 8-inch – 6-inch
	Barbette shields 10-inch – 8-inch
	Casemates 6-inch
	Lower deck 2½-inch
	Middle deck 2-inch – 1-inch
	Main deck 2-inch – 1½-inch
	Forward conning tower 14-inch
	After conning tower 3-inch
Complement	733. 789 as flagship

The *Bulwark* was another of the "London" class battleships. She cost £997,846 to build and first commissioned in March 1902 as flagship of the Mediterranean fleet. Fire controls were fitted during 1904-6 and she returned to England to become flagship of the Home fleet in February 1907 and refitted at the end of the year. In August 1908 she joined the Channel fleet and in April 1909 the 1st division, Home fleet. In March 1910 the *Bulwark* transferred to the Home fleet at the Nore with a nucleus crew as vice-admiral's flagship, 3rd and 4th divisions. In April 1911 she



50 *BULWARK, BRITISH 1902*

became a private ship and this photograph was taken in June 1911. It shows her fire control installations completed in the upper fore and the after tops. The mounting of the 12-pounder, quick-firer batteries behind light armour on the upper deck amidships was questionable, as war experience in the Sino-Japanese war of 1894-5 had shown that light guns were better left exposed, allowing all but direct hits to pass them, as the shields or light protection only caused the shells to burst, resulting in heavy casualties.

In June 1912 she joined the 5th battle squadron and was 2nd fleet flagship of the rear-admiral in August and September. Later in the year she was a unit of the 5th battle squadron and was serving with it when she was destroyed by an explosion on November 26th 1914, while lying in the river Medway. She had shipped some ammunition the day before and at 7.50 am a spurt of flame emerged near her after turret and ran forward as the ship exploded with great violence, the report being heard in London. Of a crew of almost eight hundred, only fourteen survived and two of these died soon afterwards. At first sabotage was suspected but later it was thought that a defective lyddite shell had caused the accident. The accident came at a time of increasing pessimism as the war showed signs of proving a harder struggle than the British public had at first envisaged and the loss of a battleship, old and outdated though she was, was a sèrious blow to morale.

Albemarle

BRITISH 1903 *Plate 51*

Built	Royal Naval dockyard, Chatham
Laid down	January 1900
Launched	March 1901
Completed	November 1903
Dimensions	*Length overall* 432ft
	Length 405ft
	Breadth 75ft 6in
	Draught 25ft 3in mean. 26ft 4in maximum
Displacement	13,440 tons normal. 14,930 tons deep load
Machinery	Twin screw
	Two 4-cylinder vertical inverted triple expansion engines by Thames Ironworks
	Twenty-four Belleville type boilers
	IHP natural draught = 18,000 = 19 knots. 8 hours trial = 18.6 knots
Bunkers	Coal. 900 tons normal. 2,240 tons maximum
Endurance	7,200 miles at 10 knots
Armament	Four 12-inch 50-ton. 40 calibre. Two forward and two aft
	Twelve 6-inch quick-firers. 45 calibre
	Ten 12-pounder quick-firers
	Six 3-pounders
	Two machine-guns
	Four 18-inch diameter torpedo tubes submerged
Armour	*Belt* 7-inch – 3-inch. 286ft long by 14ft wide
	Bulkhead aft only 11-inch – 7-inch
	Barbettes 11-inch – 4-inch
	Barbette shields 12-inch – 3-inch
	Casemates 6-inch – 2-inch
	Protected deck 2½-inch slopes. 1-inch on flat
	Maindeck where armoured 2-inch
	Conning tower 12-inch
Complement	750 778 as flagship

During the late 1890's Russia was building several battleships with a continuous sea speed of 16 knots. The *Pobieda (Plate 46)* was one of this type, which carried only 10-inch guns. To counter this design the Admiralty ordered six battleships of the "Duncan" class, which included the *Cornwallis, Albemarle, Exmouth, Russell, Montagu,* and *Duncan,* laid down between 1899 and 1900 and completed by 1904.

Their design was based on the "Formidable" type but a speed of 19 knots was intended, with a continuous sea speed of 18 knots. On trials the *Cornwallis* proved fastest at 19.56 knots but the *Albemarle* was the most reliable fast ship of the class.

The armour protection was a subject of controversy and was limited to save weight and achieve the desired speed. The prominent ventilator cowls of earlier ships were discarded in favour of wind sails – the first complete installation of this sort in British battleships. This was the last class of battleship to be painted in the smart black, white and buff of the British fleet.

The *Albemarle* and *Montagu* were ordered last, in 1899, and all were delayed by strikes and labour unrest in the shipbuilding and engineering industries.

The *Albemarle* cost £1,100,000 and first commissioned at Chatham for the Mediterranean fleet in November 1903, serving as third flagship until July 1905 when she joined the Channel fleet. In February 1907 she became rear-admiral's flagship, Atlantic fleet, and during that month collided with the sister ship *Commonwealth,* with slight damage. From January until May 1909 she was rear-admiral's flagship, Gibraltar, but in February 1910 was part of the 3rd division, Home fleet, at the Nore, reduced to a nucleus crew. She transferred to Portsmouth as rear-admiral's flagship during June to October 1910. This photograph was taken at that time. She lies at the head of four sister ships. Fire controls have been fitted and extensive wireless aerials, but the style and arrangement of the "Duncan" class remained related to the "Royal Sovereign" type of battleship of ten years earlier.

114 *51 ALBEMARLE, BRITISH 1903*

The *Albemarle* refitted throughout 1912, then joined the 4th battle squadron, Home fleet. In May 1913 she became a gunnery tender at Portsmouth but retained a place in the 6th battle squadron.

In August 1914 the *Albemarle*, with the *Russell* and *Exmouth*, joined the Grand fleet at Scapa Flow, and served in the northern patrol between Scotland and Norway. These ships of the 6th battle squadron were placed ahead of the more valuable "Dreadnought" type battleships of the Grand fleet when proceeding to sea through waters unswept for mines, and became known as the "mine bumpers", until moved in November 1914 to other duties. During February 1915 the *Albemarle* was serving in the 6th battle squadron in the Channel fleet, later transferring to the 3rd battle squadron, both comprised of her sister ships. In November 1915 she was damaged by heavy weather in the Pentland Firth when deep loaded. She shipped a big sea which smashed her bridge. After refitting she joined the squadron at Scapa in December.

During the Allied campaign in support of the Russian war effort, the *Albermarle* was at Archangel as guardship and occasional ice-breaker with the old battleship *Glory* and the cruisers *Intrepid* and *Iphigenia*. During 1917 the *Albemarle*'s main deck battery of 6-inch guns was removed and four 6-inch guns were remounted on the deck above. She remained in reserve at Devonport until sold in 1920 for breaking up, but stranded on passage to Swansea and did not arrive there until 1922.

Dominion

BRITISH 1905 *Plate 52*

Built	Vickers
Laid down	May 1902
Launched	August 1903
Completed	July 1905
Dimensions	*Length overall* 453ft 8in
	Length 425ft
	Breadth 78ft
	Draught 24ft 6in mean. 26ft 8in maximum
Displacement	16,350 tons normal. 17,020 tons deep load
Machinery	Twin screw
	Two 4-cylinder vertical triple expansion engines by Vickers
	Sixteen Babcock and Wilcox type water-tube boilers
	IHP trials 8 hours = 18,438 = 19.3 knots
Bunkers	Coal. 950 tons normal. 2,200 tons maximum. Plus 380 tons oil fuel
Endurance	3,150 miles at 17 knots. 7,000 miles at 10 knots
Armament	Four 12-inch 50-ton guns. 40 calibre. Two forward and two aft
	Four 9.2-inch. 45 calibre. In single turrets two on each side
	Ten 6-inch quick-firers. 50 calibre
	Fourteen 12-pounder quick-firers
	Fourteen 3-pounders
	Two machine-guns
	18-inch diameter torpedo tubes. Four submerged. Two forward and two aft. A stern tube was removed soon after completion
Armour	Krupp steel
	Belt 9-inch – 2-inch
	Bulkheads aft only 12-inch – 8-inch
	Barbettes 12-inch – 6-inch
	Barbette shields 12-inch – 8-inch
	9.2-inch gun barbettes 4-inch
	9.2-inch gun barbette shields 9-inch – 5-inch
	Battery amidships 7-inch
	Lower deck 2½-inch – 2-inch – 1-inch
	Middle deck 2-inch – 1-inch
	Main deck 2-inch – 1½-inch
	Conning tower 12-inch
Complement	777. As flagship 800

The "King Edward VII" class battleships were ordered under the 1901 naval estimates and included the *Dominion, Commonwealth, Hibernia, Hindustan, New Zealand, Africa, Britannia* and *King Edward VII*. They were begun between March 1902 and July 1904 and were completed between February 1905 and January 1907. They were the last numerous class of British battleship to be built with only four main guns, but the nominal displacement was increased to about 15,700 tons.

A secondary battery of four 9.2-inch guns was added, mounted in single turrets at the corners of the superstructure, besides ten 6-inch. With the lesser guns, this resulted in six different types of ammunition being carried, which posed magazine stowage problems. When fired longitudinally the 9.2-inch guns caused a blast effect on the 12-inch turrets. They fired a shell of 380-pounds weight, capable of piercing 14-inch thick steel plate at 3,000 yards with a rate of fire of four shells each minute. However, fire control spotting became difficult since the splashes of 12-inch and 9.2-inch shells appeared similar. The 6-inch guns were mounted on the broadside only 12ft 9in above water, and were difficult to work in a seaway. A total of twenty-eight 12- and 3-pounder guns were mounted on the superstructure and the turret tops, some ships having four on a turret without shields, a practice which persisted in British battleships for some years. Bunker capacity remained as in previous classes but some oil fuel was carried, though these ships were criticised for their endurance compared with ships of foreign construction.

Having only moderate freeboard the "King Edward VII" type were

116 *52 DOMINION, BRITISH 1905*

wet in a seaway and had a quick roll but could turn in about 350 yards diameter at 15 knots.

They were completed with only searchlight platforms aloft, fighting tops being considered inefficient, but fire control platforms were fitted before they were completed.

The *Dominion* cost £1,364,318 to build and was commissioned in August 1905 with the Atlantic fleet. She grounded in Chalon Bay, St Lawrence River, during August 1906 and was repaired at Bermuda between September and January 1907, proceeding to Chatham for permanent repairs lasting from February until June 1907. During April 1909 she joined the 2nd division, Home fleet and in May 1912 transferred to the 2nd battle squadron, 1st fleet. The *Dominion* sailed for the Mediterranean fleet in October 1913 with the 3rd battle squadron, which had been sent there temporarily. By August 1914 the squadron was with the Grand fleet based on Scapa Flow and the *Dominion* became vice-admiral's flagship during August-September 1915. She then refitted at Devonport and was afterwards attacked by a German submarine in May 1916, but avoided the torpedoes. She remained with the 3rd battle squadron, Grand fleet until 1918 when she was relegated to a depot ship in the Swin, off the Essex coast, for the operations to block Zeebrugge on the Belgian coast. During 1921 the *Dominion* was sold to be broken up but was temporarily laid up at Belfast, being dismantled at Preston during 1924-5.

Commonwealth

BRITISH 1905 *Plate 53*

Built	Fairfield Shipbuilding and Engineering Company, Glasgow
Laid down	June 1902
Launched	May 1903
Completed	March 1905
Dimensions	*Length overall* 453ft 8in *Length* 425ft *Breadth* 78ft *Draught* 24ft 6in/26ft 8in
Displacement	15,610 tons normal. 17,040 tons deep load
Machinery	Twin screw Two 4-cylinder vertical triple expansion engines by Fairfield Sixteen Babcock and Wilcox type water-tube boilers IHP trials 8 hours = 18,538 = 19.01 knots
Bunkers	Coal. 950 tons normal. 2,200 tons maximum. Plus 380 tons oil fuel
Endurance	3,150 miles at 17 knots. 7,000 miles at 10 knots
Armament	*Original* 12-inch 50-ton guns. 40 calibre. Two forward and two aft Four 9.2-inch. 45 calibre. In single turrets, two on each side Ten 6-inch quick-firers. 50 calibre Fourteen 12-pounder quick-firers Fourteen 3-pounders Two machine-guns 18-inch diameter torpedo tubes. Four submerged. Two forward and two aft. A stern tube was suppressed after completion *Alterations 1918* Ten 6-inch guns removed Two 6-inch guns remounted on each side, behind shields on upper deck
Armour	Krupp steel *Belt* 9-inch – 2-inch *Bulkhead aft only* 12-inch – 8-inch *Barbettes* 12-inch – 6-inch *Barbette shields* 12-inch – 8-inch *9.2-inch gun barbettes* 4-inch *9.2-inch gun barbette shields* 9-inch – 5-inch *Battery amidships* 7-inch *Lower deck* 2½-inch – 2-inch – 1-inch *Middle deck* 2-inch – 1-inch *Main deck* 2-inch – 1½-inch *Conning tower* 12-inch
Complement	*777*. As flagship 800

The *Commonwealth* cost £1,320,127 to build and commissioned at Devonport in April 1905 for service with the Atlantic fleet. During February 1907 she collided with the battleship *Albemarle* off Lagos, sustaining severe damage. After repairs she joined the Channel fleet in May and during August grounded in the Clyde, without damage. In 1908 the *Commonwealth* became temporarily the flagship of the rear-admiral and in April 1909 was transferred to the 2nd division, Home fleet. In June 1911, when this photograph was taken, she became a unit of the 3rd division, Home fleet, stationed at the Nore, and refitted during 1912. In May 1913 she joined the 3rd battle squadron, 1st fleet, serving temporarily in the Mediterranean. In December 1914 she commenced a refit which lasted until February 1915, then rejoined her sister ships in the 3rd battle squadron, attached to the Grand fleet, based on Scapa Flow in the Orkney Islands. Before April 1915 the Grand fleet battle squadrons were a mixture of old battleships carrying only four 12-inch guns, and "Dreadnought" type battleships with upwards of ten 12-inch guns.

The eight "King Edward VII" class ships were 3 knots inferior in speed to the "Dreadnought" type ships and this complicated deploy-

53 *COMMONWEALTH, BRITISH 1905*

ment of the fleet for action. When cruising, the 3rd battle squadron were stationed astern of the "Dreadnought" squadrons with orders to take station in their rear when coming into action. During their Grand fleet service the "King Edward VII" class became known as "the wobbly eight" because of their short period of roll. Throughout the war these ships were never in a position to get a shot at the enemy, though the *Dominion, Commonwealth, Hindustan* and *Zealandia* (the renamed *New Zealand)* formed the 3rd battle squadron, Grand fleet until January 1918, led by the then equally outclassed *Dreadnought.*

During 1918 the *Commonwealth* was altered, the 6-inch guns were removed, the most advanced gunnery controls were fitted and a tripod replaced the pole foremast. Her hull was fitted with anti-torpedo bulges but she saw no action before the war ended and between 1919-21 was used as a sea-going gunnery training ship at Invergordon. The *Commonwealth* was sold in November 1921 to be broken up in Germany.

New Zealand

BRITISH 1905 *Plate 54*

Built	Royal Naval dockyard, Portsmouth
Laid down	February 1903
Launched	February 1904
Completed	June 1905
Dimensions	*Length overall* 453ft 8in
	Length 425ft
	Breadth 78ft
	Draught 24ft 6in mean. 26ft 8in maximum
Displacement	15,585 tons normal. 17,060 deep load
Machinery	Twin screw
	Two 4-cylinder vertical triple expansion engines by Humphreys, Tennant and Co
	Twelve Niclausse type boilers plus three cylindrical type
	IHP = 18,400 = 18.6 knots
Bunkers	Coal. 950 tons normal. 2,200 tons maximum
Endurance	3,150 miles at 17 knots. 7,000 miles at 10 knots
Armament	*Original*
	Four 12-inch 50-ton guns. 40 calibre. Two forward and two aft
	Four 9.2-inch. 45 calibre. In single turrets, two on each side
	Ten 6-inch quick-firers. 50 calibre
	Fourteen 12-pounder quick-firers
	Fourteen 3-pounders
	Two machine-guns
	18-inch diameter torpedo tubes. Four submerged. Two forward and two aft. A stern tube was suppressed after completion
	Alterations 1918
	Ten 6-inch guns removed
	Two 6-inch guns remounted on each side, behind shields on upper deck
Armour	Krupp steel
	Belt 9-inch – 2-inch
	Bulkhead aft only 12-inch – 8-inch
	Barbettes 12-inch – 6-inch
	Barbette shields 12-inch – 8-inch
	9.2-inch gun barbettes 4-inch
	9.2-inch gun barbette shields 9-inch – 5-inch
	Battery amidships 7-inch
	Lower deck 2½-inch – 2-inch – 1-inch
	Middle deck 2-inch – 1-inch
	Main deck 2-inch – 1½-inch
	Conning tower 12-inch
Complement	777. As flagship 800

The *New Zealand* differed from her sister ships of the "King Edward VII" class in being the only ship not originally fitted to burn oil fuel. She cost £1,335,975 to build and commissioned with the Atlantic fleet in July 1905. From October to December 1906 she was at Gibraltar refitting and in June 1907 joined the Channel fleet, refitting at Devonport during August to November 1908. In March 1909 the *New Zealand* transferred to the 2nd division, Home fleet and was temporarily the flagship of the rear-admiral. In August, when this photograph was taken, she had reverted to a private ship.

During August 1911 she joined the Portsmouth sub-division of the Home fleet and in December was renamed *Zealandia* as her name was required for the new battle cruiser *New Zealand.* In May 1912 she transferred to the 3rd battle squadron, 1st fleet, serving in the Mediterranean and afterwards was thoroughly refitted.

At the commencement of World War I she was with the 3rd battle squadron, Grand fleet, based on Scapa Flow. In November 1915 she was sent to the Dardanelles. By January 1917 she had returned to the Grand fleet and the 3rd battle squadron composed of her sister ships, remaining there until after January 1918. Later that year the *Zealandia* was altered and refitted for shore bombardment purposes in a similar manner to her sister ship *Commonwealth (Plate 53).* The 6-inch guns were removed from the main deck and four of them were remounted on the upper deck. A tripod mast was stepped forward, but the war ended almost before she was ready and the *Zealandia* became an accommodation ship at Portsmouth.

She was sold during 1921 to be scrapped, then resold to be broken up in Germany.

54 NEW ZEALAND, BRITISH 1905

121 *55 OSCAR II, SWEDISH ARMOURED COAST DEFENCE SHIP 1907*

Oscar II

SWEDISH ARMOURED COAST DEFENCE SHIP 1907 *Plate 55*

Built	A.B. Lindholmen, Gothenburg
Laid down	1903
Launched	June 1905
Completed	1907
Dimensions	*Length* 313ft 4in
	Breadth 49ft 6in
	Draught 18ft maximum
Displacement	4,270 tons
Machinery	Twin screw
	Two triple expansion engines
	Twelve Yarrow type boilers
	IHP trials = 9,400 = 18.96 knots
Bunkers	Coal. 350 tons normal. 500 tons maximum
Endurance	2,950 miles at 10 knots
Armament	Two 8.3-inch. 45 calibre. In single turrets forward and aft
	Eight 6-inch. 50 calibre. In paired turrets port and starboard
	Ten 6-pounders
	Three 1-pounders
	Two 18-inch diameter torpedo tubes
Armour	*Amidship belt* 6-inch
	Deck 2-inch
	Bulkheads 6-inch
	8.3-inch gun-turrets 7½-inch – 5-inch
	Hoists 7-inch
	6-inch gun-turrets 5-inch – 3-inch
	Conning tower 7-inch
Complement	326

The Royal Swedish Navy was a coast defence force with a total personnel of 4,000 in 1906. The minister of sea defence was often a general and the ministry suffered from political interference in a traditionally pacifist country.

Sweden too was affected by the general wave of naval enthusiasm and expansion of trade and merchant shipping throughout Europe at the beginning of the present century, and was influenced as well by the rise of German militarism and her proximity to Russia. Though Swedish armed forces could not expect to counter a major power, the neutrality of coastal waters could best be confirmed by a show of naval force.

The *Oscar II* was one of a developing series of small armoured coast defence ships designed for the Swedish Navy, which rated them as first class *pansarbatar*. The series commenced with the 258ft *Gota, Thule* and *Svea* of 1895, mounting one 8.3-inch and seven 6-inch guns, through the 3,715-ton *Oden* of 1896 and the similar *Thor* and *Niord* of 1899 armed with two 10-inch and six 4.7-inch guns, to the more distinguished looking *Dristighenten*, a 3,600-tonner completed in 1902 with two 8.3-inch and six 6-inch guns. The *Aran* , *Vasa*, *Tapperheten* and *Manligheten* of 1901-3 were similar, but reverted to single turret mounts for the 6-inch guns.

The *Oscar II* was a good example of a well-designed, compact, coast defence ship with arrangement probably influenced by contemporary "pre-Dreadnought" battleships in major navies. A single 8.3-inch gun was mounted forward and aft and the 6-inch were in turret-mounted pairs, with the casings recessed in way of the traverses. Her length of 316ft improved speed to about 19 knots and she was a good sea boat.

No further Swedish coast defence ships were ordered until 1911 when the *Sverige, Drottning, Victoria* and *Gustav den Femta* were projected, but the orders were cancelled after Liberal Party agitation in Parliament. This angered many Swedes and a fund to build some of these ships raised the equivalent of £970,000 by the end of April 1912 and the orders were finally placed during 1912 and 1915, for the first two ships.

Swedish warships rarely left the Baltic as the country had few colonies or international obligations. The fleet exercised and patrolled in home waters or refitted at the naval dockyards of Karlskrona and Stockholm.

The *Oscar II* was present at the British naval review for the coronation of King George V in 1911, when the photo (frontispiece) was taken.

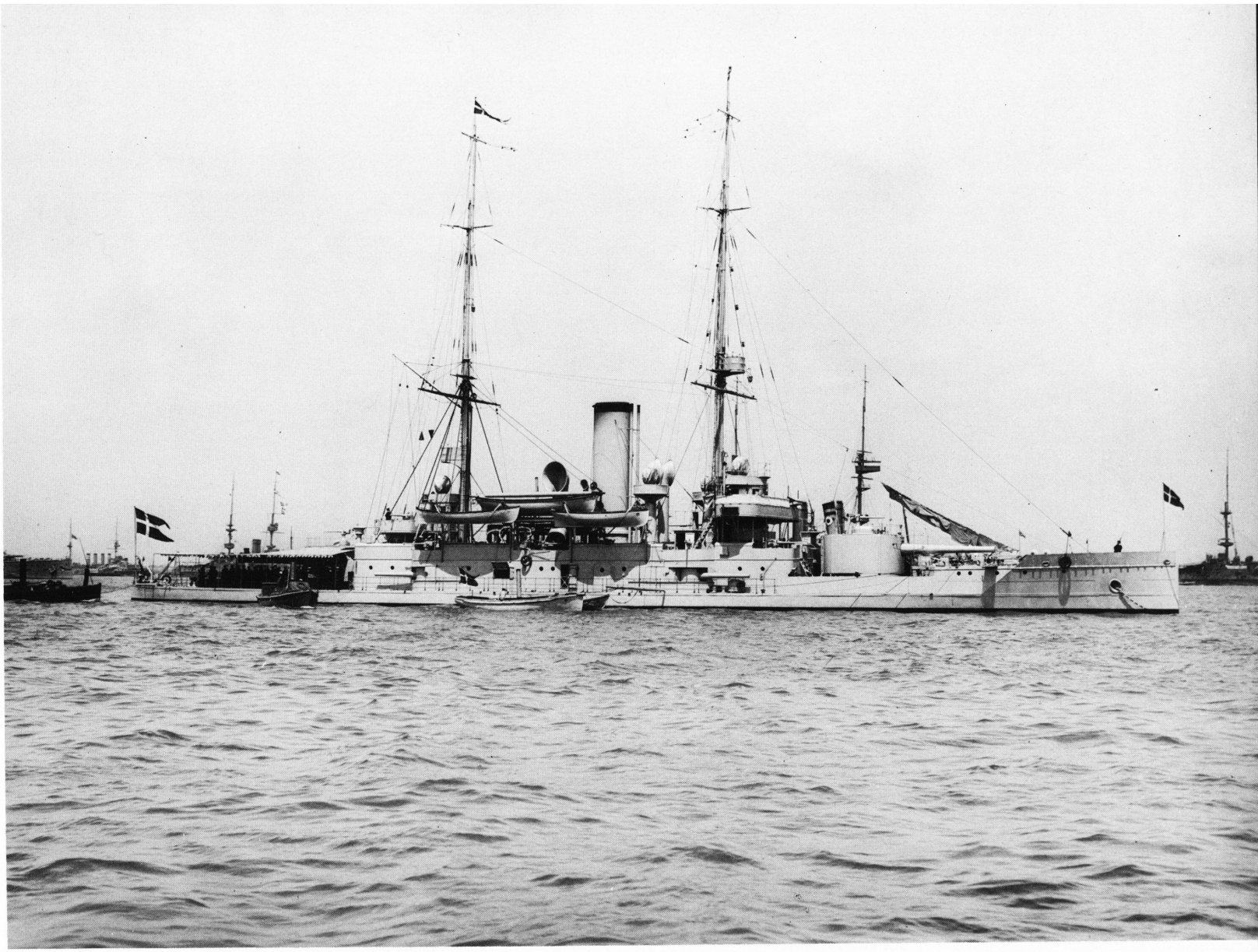
In 1920 her official name was *Oscar den Anrdra*, but armament and appearance remained unchanged for many years.

The *Oscar II* saw no action throughout her existence as Sweden remained neutral during the two world wars; the fleet vigilant but at peace. In 1939 the torpedo tubes were removed and four 57-mm guns and two 25-mm anti-aircraft guns were added to the ship during a programme of reconstruction. During 1950 the *Oscar II* was removed from the active fleet, the armament was unshipped and she was berthed at the quay of Berga naval school as a damage-control training hulk. She continued to serve until sold in September 1974, to be scrapped at Gothenburg.

Olfert Fischer

DANISH ARMOURED COAST DEFENCE SHIP 1905 *Plate 56*

Built	Royal Naval dockyard, Copenhagen
Laid down	1901
Launched	May 1903
Completed	1903
Dimensions	*Length between perpendiculars* 271ft 8in
	Breadth 50ft 6in



123 *56 OLFERT FISCHER, DANISH ARMOURED COAST DEFENCE SHIP 1905*

	Draught 16ft 9in maximum
Displacement	3,700 tons
Machinery	Twin screw
	Two triple expansion engines
	Six Thornycroft boilers
	IHP trials = 4,600 = 15.8 knots
Bunkers	Coal. 255 tons maximum
Endurance	Approx 2,000 miles at 10 knots. 1,050 miles at 14¾ knots
Armament	*Original*
	Two 9.4-inch Bofors guns. 43 calibre. In single turrets one forward and one aft
	Four 5.9-inch Bofors quick-firers. 43 calibre. In casemates
	Ten 6-pounder quick-firers
	Six smaller guns
	Two machine-guns
	Three 18-inch diameter torpedo tubes. One bow. Two broadside. All submerged
	Modified by 1920
	Two 9.4-inch
	Four 5.9-inch
	Six 14-pounders
	Two 6-pounder anti-aircraft guns
	Two 1-pounders
	Two machine-guns
	Three 18-inch torpedo tubes
Armour	Creusot steel
	Belt 7-inch amidships. 4-inch aft. 7ft wide
	Bulkhead 7-inch
	Turrets 7-inch
	Casemates 5.9-inch
	Protective deck 3-inch forward
	Conning tower 7-inch
Complement	250 – 255

The *Olfert Fischer* was one of a class of Danish armoured coastal defence ships which commenced with the *Herluf Trolle*, laid down in 1896, and included the *Olfert Fischer* and the later *Peder Skram*, completed in 1909. Although very similar they were not identical. These ships were smaller and lighter versions of the various coast defence ships built for Norway and Sweden at the end of the 19th century and early in the 20th. The role of the Royal Danish Navy was defensive and although small it was of high standard.

These three armoured ships, with the older ship *Skjold* and the larger *Niels Juel* completed in 1922, formed the backbone of the Danish Navy for thirty years. They were wet sea boats, having a freeboard of only three feet. The *Olfert Fischer* failed to attain her designed speed of 16 knots with 4,200 IHP.

This photograph, taken in 1911, shows her circular turrets and the monitor-like hull. The tall topmasts were fitted to carry wireless equipment.

The *Olfert Fischer* was paid off in October 1936. On the 5th, 6th and 7th of October she was used as an aerial bombing target by the Danish Air Force, steaming at 9 knots. Three hundred and eight-six bombs were dropped, of which only twelve hit the ship. She returned to harbour and the hull was sold to a firm of Danish ship-breakers. The armour was sold to Sweden but her guns had been retained and were stored until 1948, when they were sold for scrap.

Dreadnought

BRITISH 1906 *Plates 57 and 58*

Built	Royal Naval dockyard, Portsmouth
Laid down	October 1905
Launched	February 1906
Completed	October 1906
Dimensions	*Length overall* 527ft
	Length between perpendiculars 490ft
	Breadth 82ft
	Draught 26ft 6in normal
Displacement	17,110 tons normal. 21,845 tons deep-loaded
Machinery	Four screws
	Four steam turbine engines by the Parsons Steam Turbine Co
	Eighteen Babcox andWilcox boilers
	HP 23,000 = 21 knots
	HP trials 26,350 = 21.6 knots
	Continuous sea speed = 18.5 knots
Bunkers	Coal. 900 tons normal. 2,900 tons maximum. Plus 1,120 tons oil fuel and 120 tons patent fuel
Endurance	6,620 miles at 10 knots
	4,910 miles at 18.4 knots
Armament	*Original*
	Ten 12-inch guns. 45 calibre. Five paired turrets. Three on middle line and one on each beam
	Twenty-four 12-pounder quick-firers
	Five 18-inch diameter torpedo tubes submerged. Four broadside. One stern
	Alterations in 1916
	Only ten 12-pounder guns were mounted
Armour	*Belt* 11-inch – 8-inch – 6-inch – 4-inch
	Bulkheads 8-inch

125 *57 DREADNOUGHT, BRITISH 1906*

126 *58 DREADNOUGHT, BRITISH 1906*

Barbettes 11-inch – 4-inch
Turrets 11-inch
Conning towers 11-inch – 8-inch
Main deck ¾-inch
Middle decks 3-inch – 1¾-inch
Lower decks 4-inch – 1½-inch
Complement 695. 773 as flagship

The *Dreadnought* was the first large warship propelled by turbines and the first British battleship to steam at 21 knots. She carried a revolutionary "all big gun" armament for long range firing and was unique in arrangement by having officers' accommodation forward and crew accommodation aft.

The 1903 edition of *Fighting Ships*, edited by F.T. Jane, contained an article by the distinguished Italian naval constructor V. Cuniberti, advocating an ideal battleship for the British fleet: a 17,000-ton ship with twelve 12-inch guns, well protected, and capable of 24 knots. The outline design was intended to attack an enemy ship at moderate or close range with concentrated fire. However, increasing accuracy and range of guns, improved shells and need for salvo-firing to assist gunnery control at longer ranges, combined with results of gunnery tests, proved that a uniform main armament of ten heavy guns could be most effective. Threat of torpedo attack also tended to increase battleship range from the 3,000 yards common in 1903 to a possible 6,000 yards with advanced gunnery techniques, with probable hits at 8,000 yards.

Many considered the mixed-armament, 18-knot *Lord Nelson* and *Agamemnon*, then building, to be the best type of battleship for Britain; others feared that Germany would produce an "all big gun" ship capable of accurate fire at extreme range and of high speed.

During 1904 and 1905 British naval authorities pondered the construction of such a ship and early in 1905 the Americans authorised the sister battleships *Michigan* and *North Carolina*, to carry eight 12-inch guns and twenty-two 3-inch, on a displacement of 16,000 tons and with a speed of 18.5 knots. Some naval board members had pressed for 19,000-ton ships with ten 12-inch guns.

Britain could no longer delay if she wished to be able to claim she was the first to commission an "all big gun" battleship. A quick decision was made by Sir John Fisher, who had become First Sea Lord in October 1904. He claimed to have first considered the type during 1900 and later to have discussed it with Mr Gard of the Royal Corps of Naval Constructors. In 1904 he instituted a committee of naval officers, constructors and shipbuilders to examine the need for and construction of the new type of battleship, which many held to be a mistaken policy which would put British naval supremacy in hazard by rendering obsolete all other existing battleships and reducing Britain's considerable lead over the battleship forces of other nations to only one ship.

The decision made, great care was taken to ensure she would be successful; she was strongly constructed to withstand the effects of salvo-firing of eight 12-inch guns simultaneously, compared with the four 12-inch of earlier battleships. A speed of 21 knots was desired, and to achieve it and to lower the centre of gravity of the machinery weights to compensate for the increased weight of armament, Fisher agreed to the use of steam turbines in place of the usual reciprocating steam engines which, although capable of propelling contemporary battleships at 18 knots on trials, broke down if full power was imposed for any length of time, reducing the effective sea speed of battle fleets to about 14 knots. Turbines had previously only been fitted in destroyers and one cruiser was building which would have them. To choose such untried machinery for Britain's most advanced and experimental warship was dangerous but characteristic of the whole "Dreadnought" scheme. Parsons, the marine turbine manufacturer, assured the committee of the efficiency of their machinery, which was to drive four instead of the usual two screws of earlier battleships and had an astern turbine on each propeller shaft. The *Dreadnought*'s turbine installation was as revolutionary as the "all big gun" armament, and as successful.

When completed the *Dreadnought* outclassed all other battleships. The advantage was short-lived but she achieved renewed respect for the British Navy and the speed and secrecy of her construction took other nations by surprise. Her construction created a dilemma about the future of the battleships *Lord Nelson* and *Agamemnon*, which were still building at the time. It was decided eventually to complete these ships as designed, with four 12-inch guns, but to appropriate their already manufactured 12-inch guns for use in the *Dreadnought*, to speed her completion, which was of paramount importance. It was also decided that no other British battleship would be commenced until the *Dreadnought* had undergone trials.

The *Dreadnought* was laid down at Portsmouth dockyard on 2nd October 1905 and was launched on 10th February 1906. She was completed for trials on 3rd October 1906; an unprecedented speed for a large and experimental capital ship and only made possible by the suspension of much other construction. To speed building, much of the work of drawing office and mould loft was combined, resulting in rapid laying-off and material template making. She cost £1,783,883.

The *Dreadnought* was first commissioned, in reserve, on 1st September 1906. Her trials, which occupied October, November and December, were held in the West Indies as being the area most secluded from rival observation. The engines proved reliable and after a month's steaming she returned on a 7,000-mile passage back to England at an average speed of 17½ knots, without defects.

She joined the Home fleet for special service and became flagship of the commander-in-chief during April 1907. This photograph was taken a few months later and shows the positioning of her turrets which enabled eight of her ten 12-inch guns to fire abeam. The tripod masts were an innovation but the after mast was too low to be effective and the

foremast fire-control top suffered from funnel fumes and heat.

During May 1912 the *Dreadnought* was relieved by the battleship *Neptune*. She then joined the 1st division, Home fleet and became flagship of the 4th battle squadron from December 1912 until May 1916. On March 18th 1915 she rammed and sank the German submarine *U 29* during a North Sea sweep.

The *Dreadnought* was refitted in the spring of 1916 and in May transferred to the 3rd battle squadron as flagship, based on Sheerness as protection against a repetition of the German naval raids on the English east coast. She rejoined the Grand fleet in March 1918, serving with the 4th battle squadron until July 1918, when she was paid off. In February 1919 she went into reserve at Rosyth and was offered for sale by March 1920. A year later she was sold, to be scrapped at Inverkeithing during 1923.

The *Dreadnought* remains perhaps the best-remembered British battleship and was followed by numbers of "improved Dreadnoughts", as the type became known, then by "super Dreadnoughts" and even "hyper-super Dreadnoughts". Until 1918 navies measured their power by possession of a greater number of "Dreadnought" type battleships than their rivals. Afterwards the term fell into disuse.